1940

OLDSMOBILE

HYDRA-MATIC DRIVE

SERVICE INSTRUCTIONS

OLDSMOBILE DIVISION

GENERAL MOTORS SALES CORP.

THE 1940 MECHANICAL PROGRAM COVERS THE FOLLOWING MAJOR SUBJECTS:

1 MECHANICAL CHANGES IN THE 1940 OLDSMOBILE

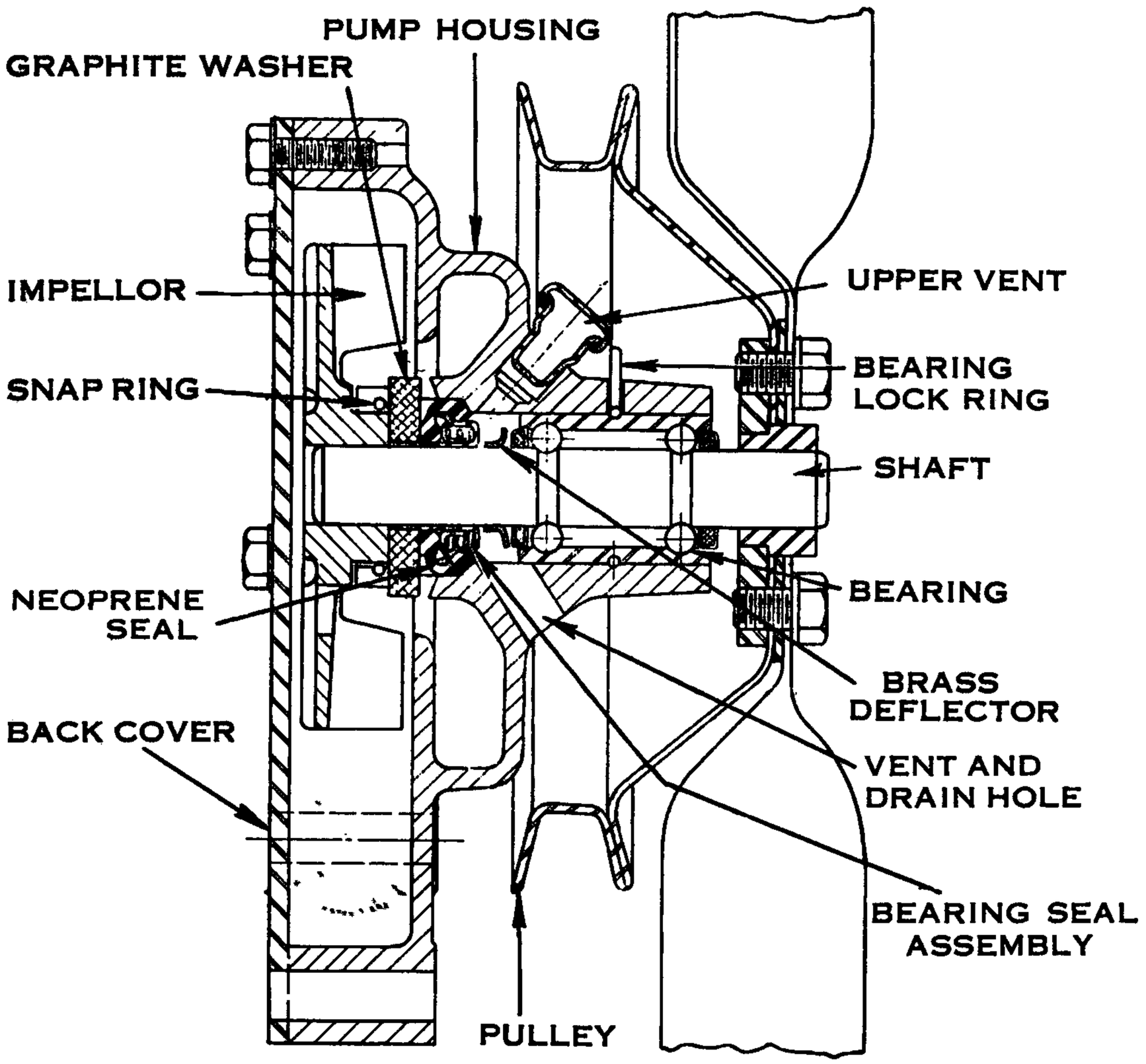
2 SERVICE CORRECTIONS 1939 AUTOMATIC TRANSMISSION

3 HYDRA-MATIC DRIVE

I

MECHANICAL CHANGES IN THE 1940 OLDSMOBILE

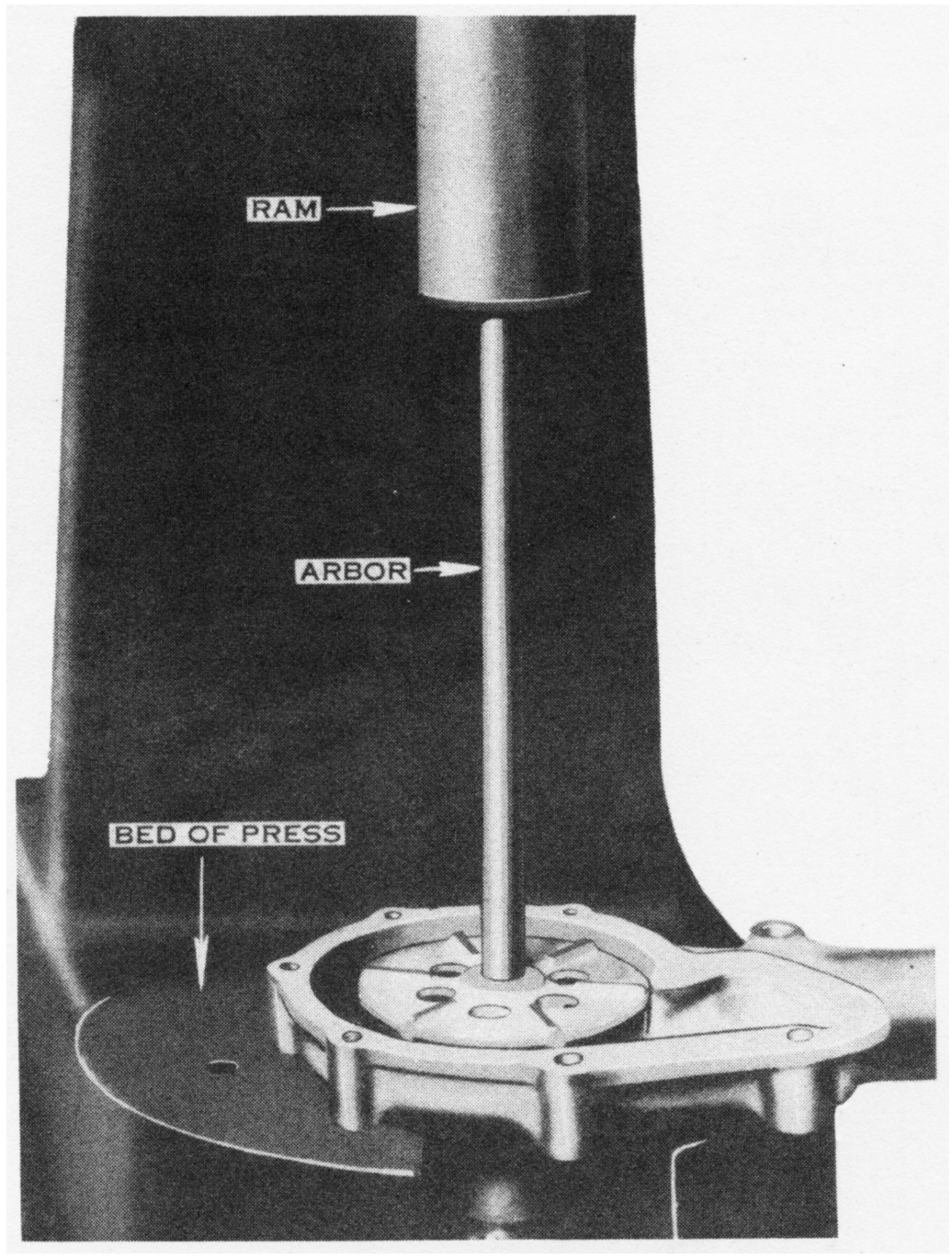
WATER PUMP



The same type water pump as used in 1939 will be continued except a large atmospheric vent in the form of a drilled hole through the upper side of the water pump body and a large drain hole at the bottom side of pump body, minimizing moisture formation in pump assembly. The upper drilled hole is covered with a cap so that no water or foreign matter can enter inside of pump. The cap is pressed into place and should never be disturbed unless absolutely necessary.

The small neopreme seal over the rear end of double row bearing has been replaced with a brass moisture slinger.

DISASSEMBLING WATER PUMP



Remove water pump from motor.

Remove fan blades and fan pulley.

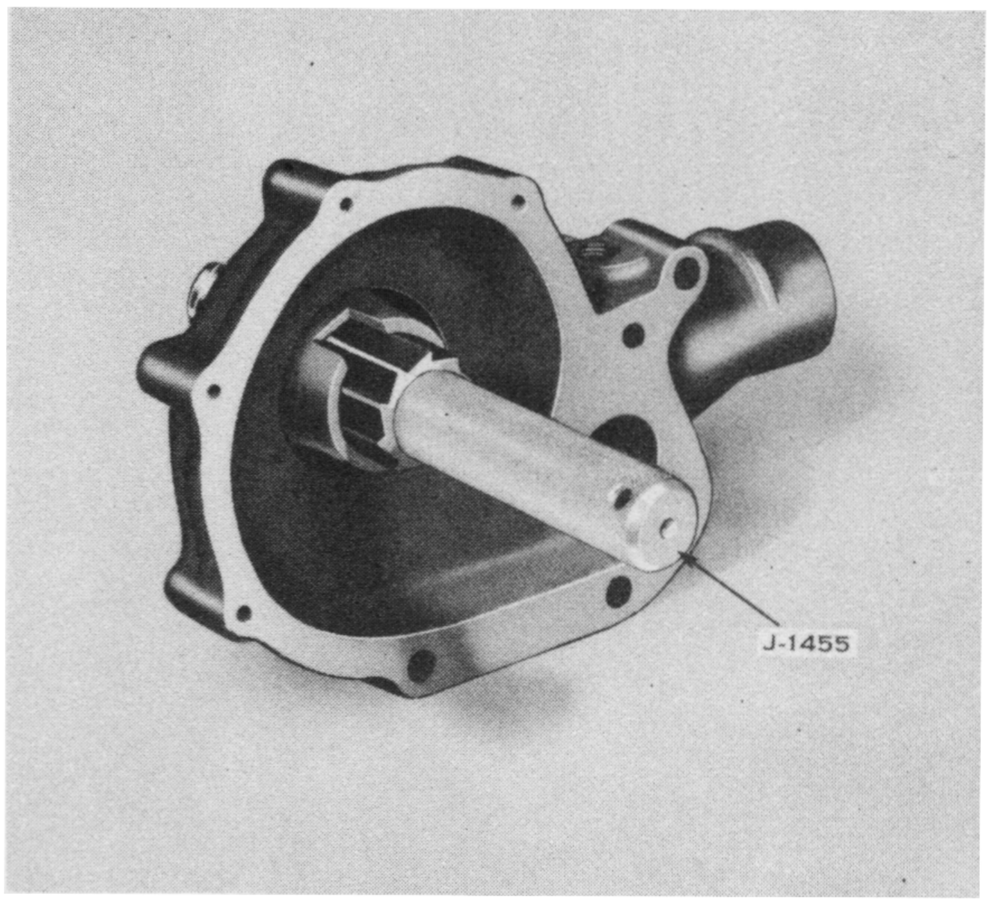
Remove cover plate and bearing retainer lock ring.

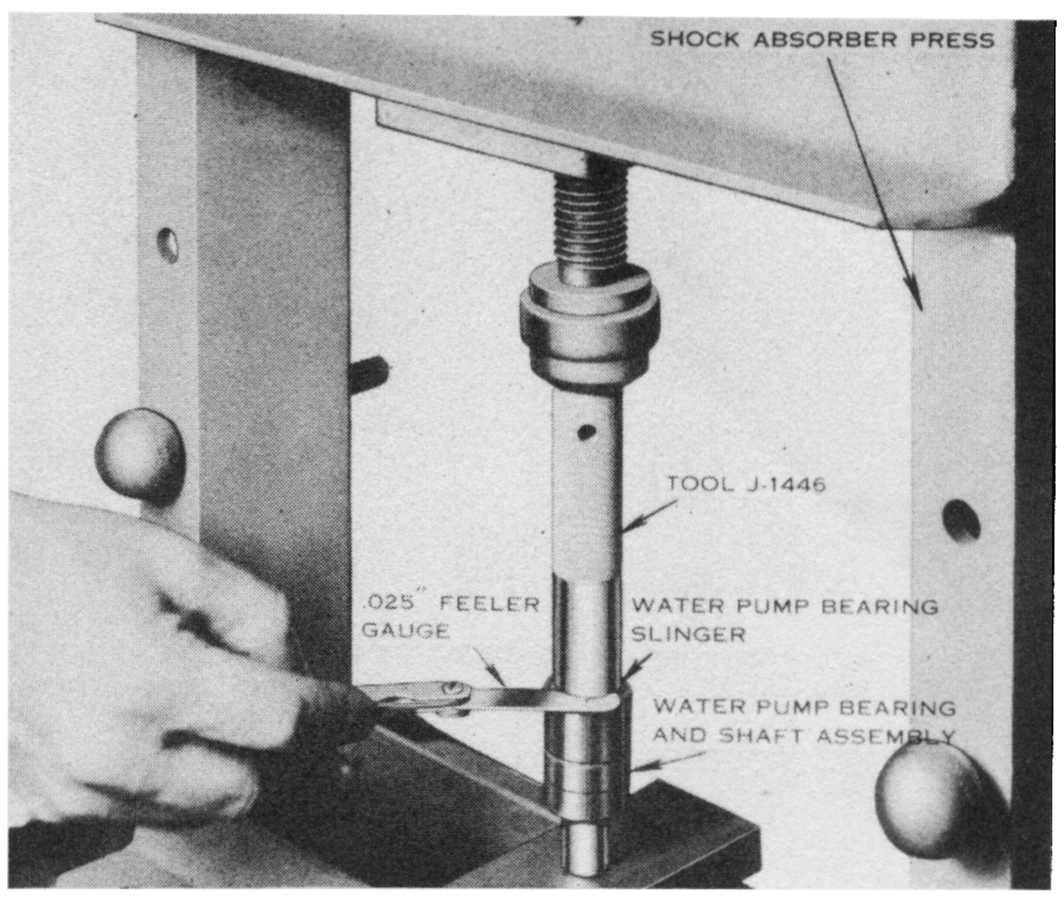
Support water pump body in arbor press and press pump shaft and bearing assembly out of impellor and body. Remove graphite washer snap ring. Graphite washer and seal can then be pushed out of body.

The bearing and pump shaft will be serviced as an assembly.

The bearing seal consists of four parts--inner retainer, outer retainer, spring, and rubber grommet.

WATER PUMP ASSEMBLY



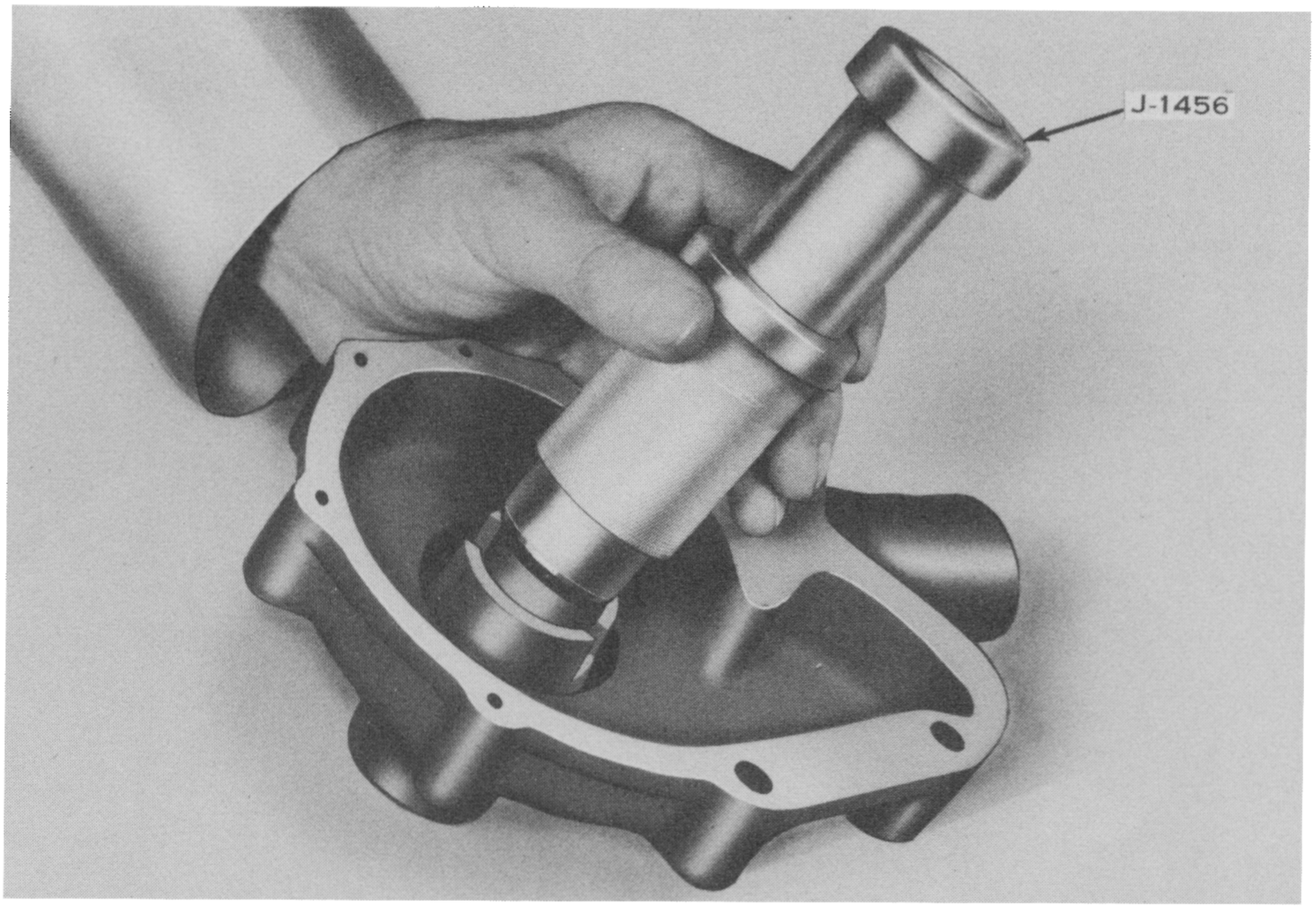


Before installing new parts in Water Pump Body it is necessary to clean the 32o seat that the seal rests on; also the inner diameter of the housing which holds the seal. Use water pump housing cleaning reamer, Tool #J1455 and revolve reamer by hand as shown until the seal seat and inner diameter are clean.

INSTALLING WATER PUMP SHAFT SLINGER

Place slinger over shaft and with tool J-1446, press slinger towards bearing until a clearance of .025" exists between the bearing and slinger as measured by a feeler gauge as shown.

ASSEMBLING WATER PUMP

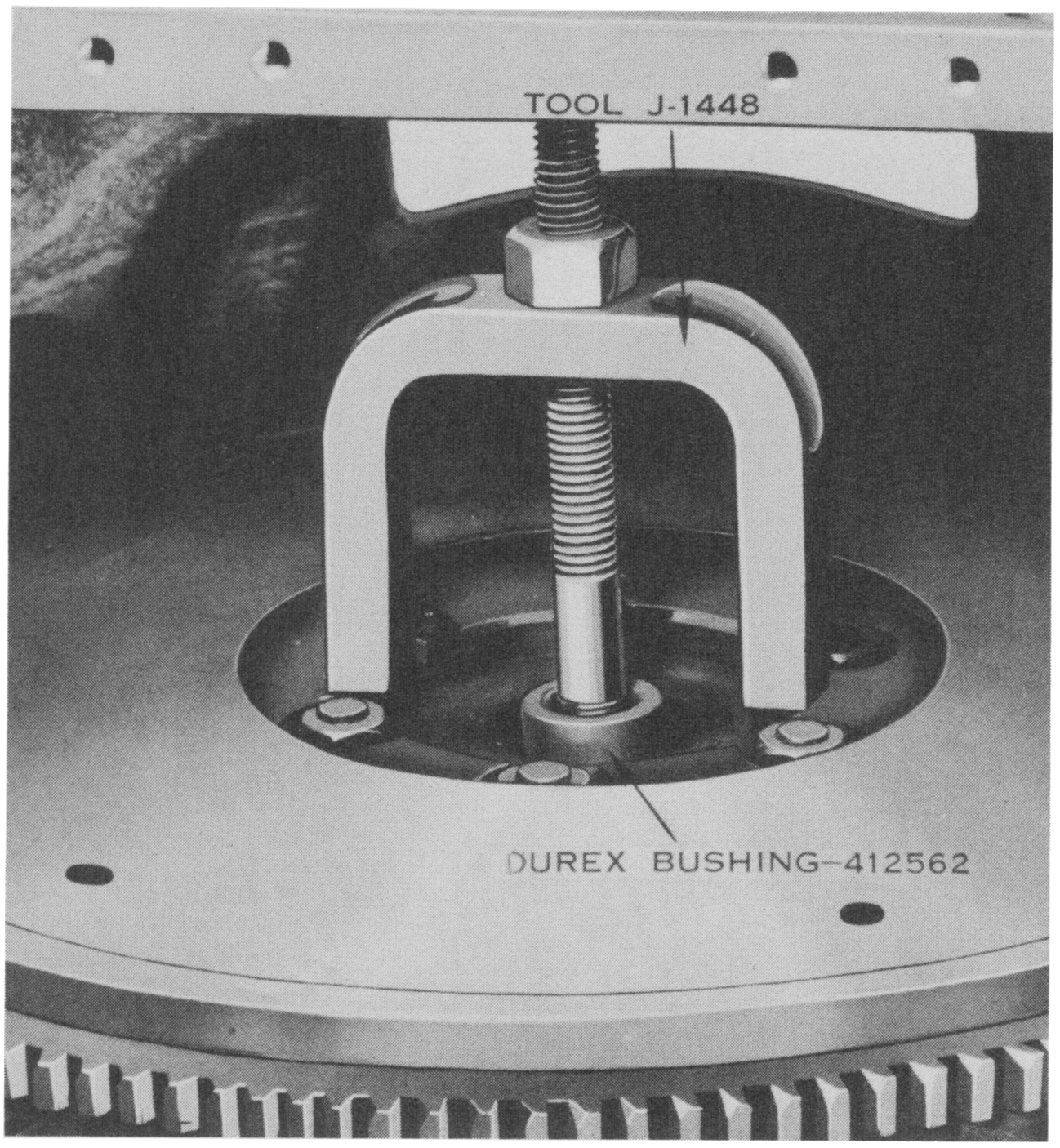


Install bearing seal in housing using seal loading tool #J1456 with inner retainer to fan pulley end. Install graphite washer flat side to seal.

Using an Arbor Press, push the bearing and shaft assembly in housing until the groove in bearing matches with the slot in pump body. Install bearing retainer lock ring. Press impellor on shaft until there is 1/32 inch clearance between the machined surface of the impellor and flange on pump body. Be sure that the bearing is pushed forward on snap ring. Install cover.

Always install new gaskets and the rubber grommet between back of pump body cover and cylinder head.

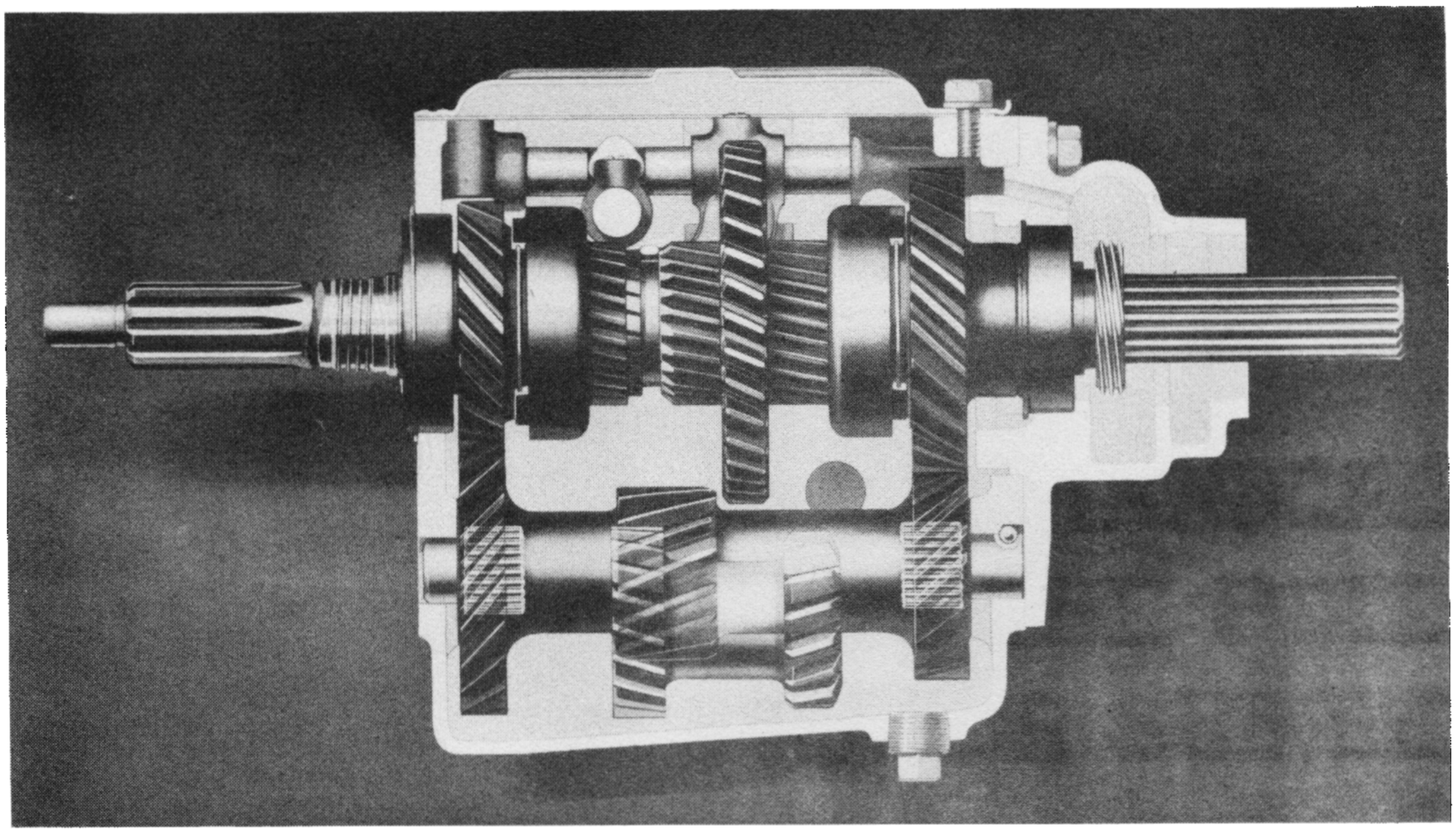
CLUTCH SHAFT PILOT BEARING



A durex bushing is used on all models. Immediately ahead of the bushing is a felt ring impregnated with S. A. E. 30 oil to keep bushing lubricated. The felt and bushing are held in place by a sheet metal retaining ring pressed into the crankshaft. The pilot bearing may be removed with tool J1448 as shown.

Bearing may be replaced by use of tools J1329 and J1329-2.

SYNCROMESH TRANSMISSION



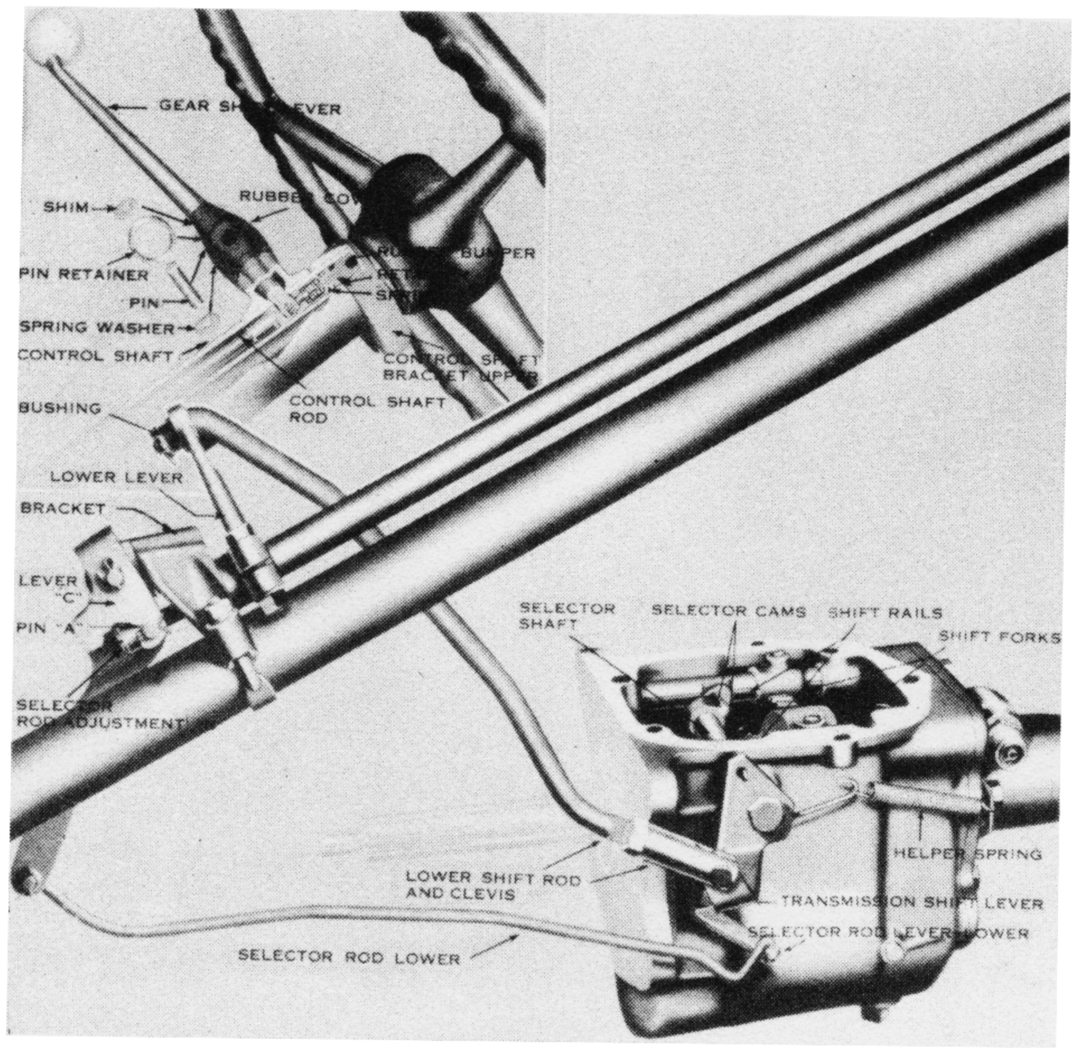
The Standard Syncromesh Transmission remains the same as used on the 1939 model except for the following changes.

1. A steel lower selector rod replaces the previously used flexible cable and conduit assembly. The transmission end of the lower selector rod is assembled to a lower selector rod lever on the left side of the transmission case.

2. The "F" model does not use the rear transmission extension. The "G" and "L" model make use of an 11" rear transmission extension. This is considerable shorter than the one previously used. No steel reinforcing plate will be used between the clutch housing and fly-wheel pan; a gasket only will be used.

3. Needle bearings are used at both inner and outer ends of the counter shaft, providing increased efficiency and longer life.

DISASSEMBLING TRANSMISSION



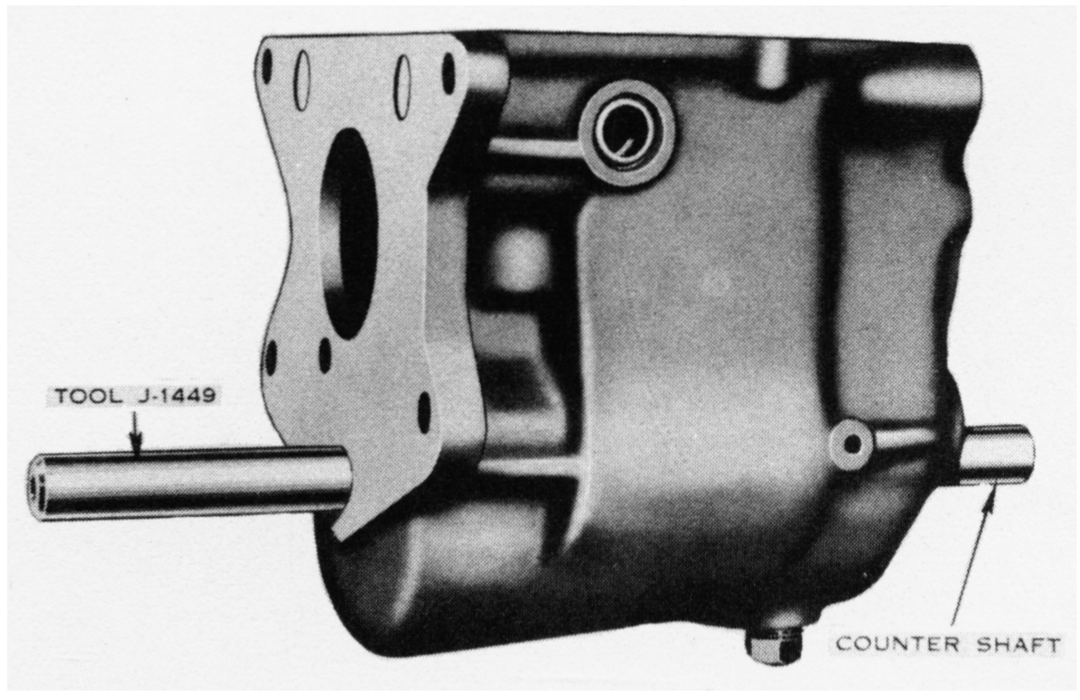
The dissembling of the transmission is the same as the 1939 transmission with the following exceptions.

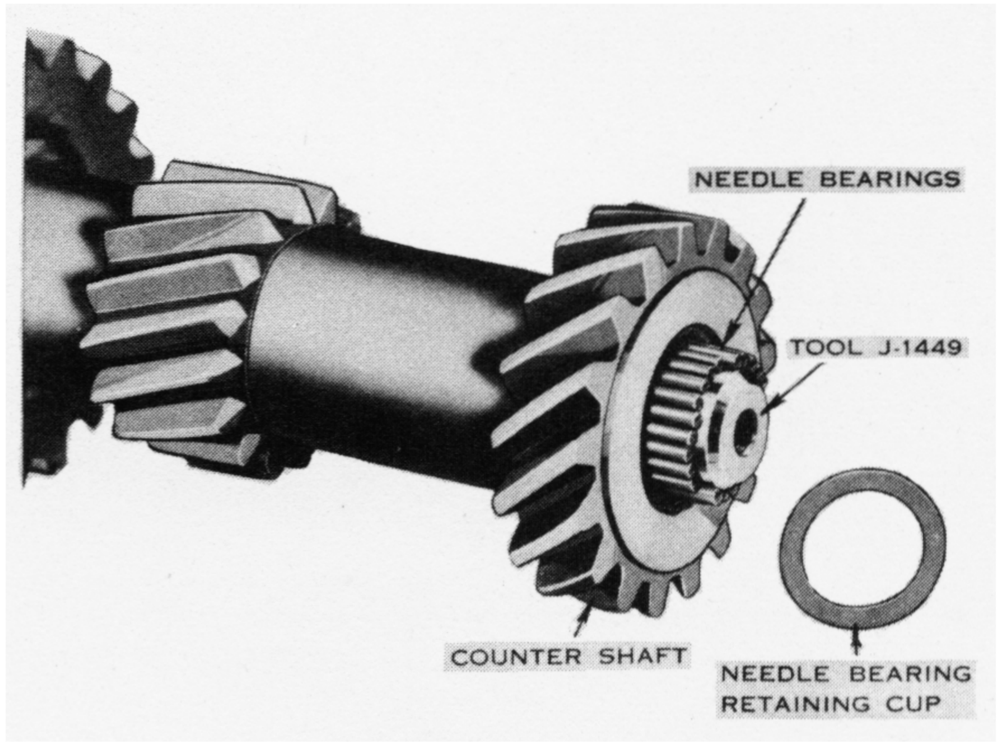
1. When removing the special 3/4" shifter lever bolt from left end of selector shaft to remove or install shifter lever from end of shaft, hold transmission shifter lever in neutral position with auto wrench or small bending bar. If this caution is not observed, breaking of the internal shifting cams is likely to occur.

Remove outer lever selector from left side of case.

Drive selector shaft through right side of transmission case, using babbitt hammer. Welsh plug at right side of case will need to be driven out.

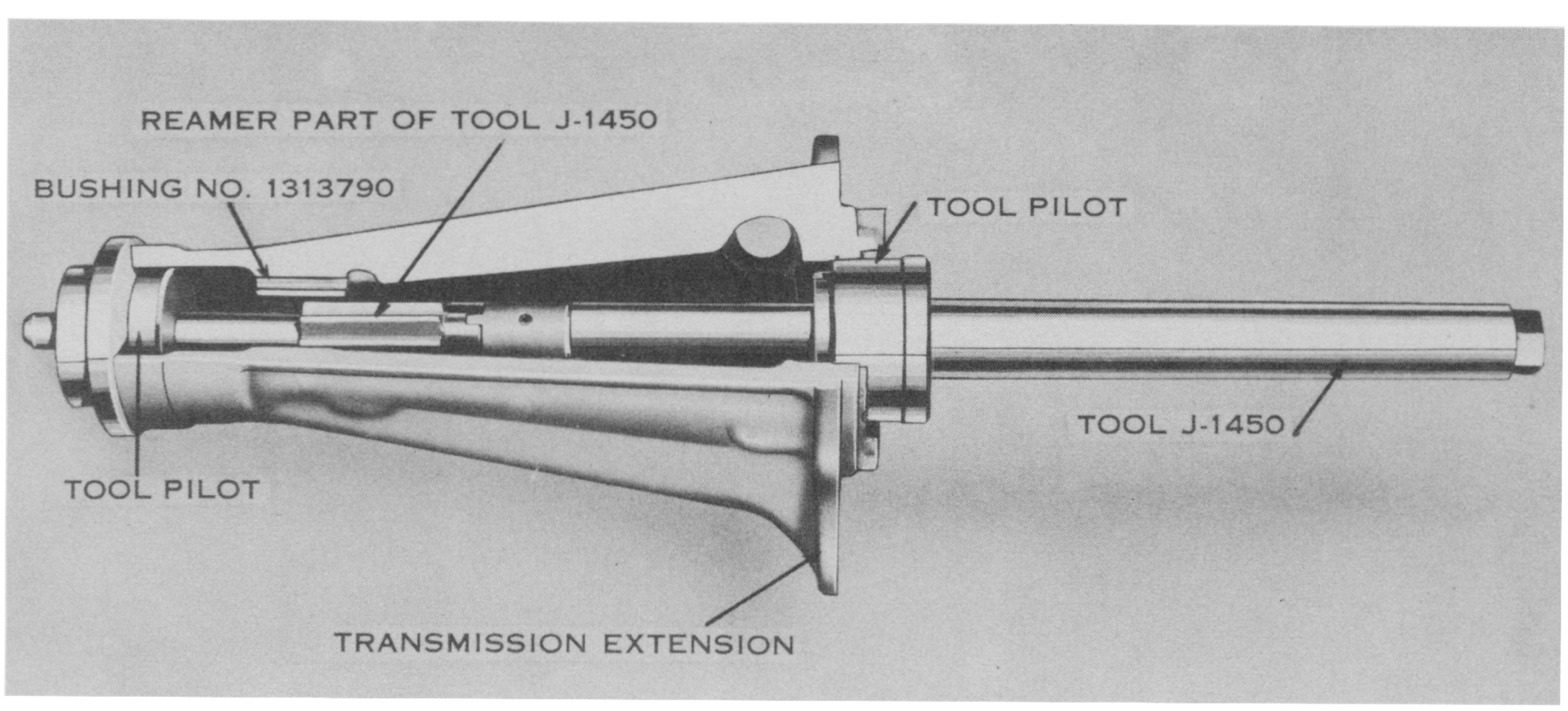
REMOVE COUNTER SHAFT





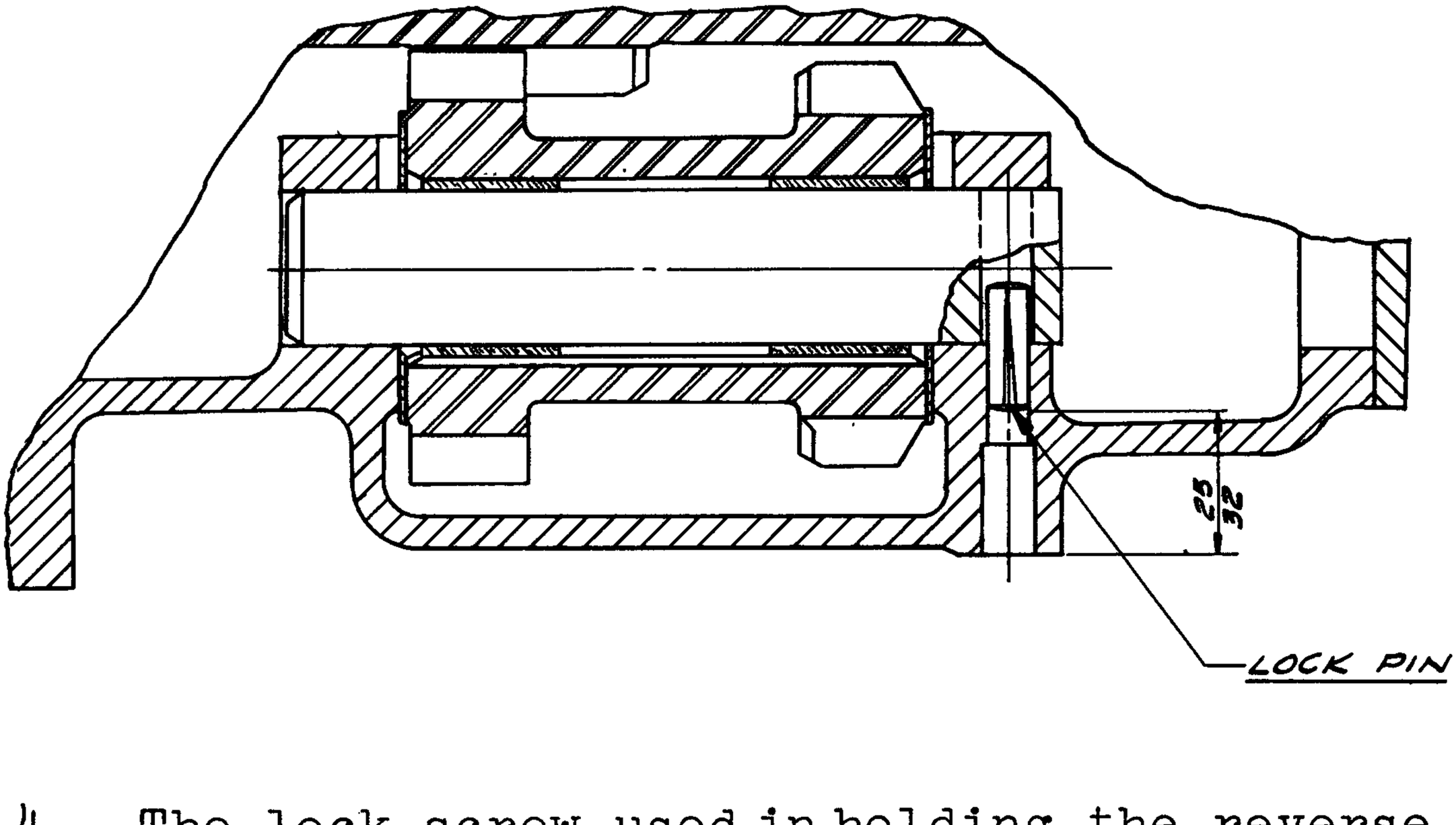
2. Remove counter shaft. Push to rear of transmission using tool J1449. Make sure tool J1449 follows counter shaft closely or otherwise needle bearings in counter shaft will fall to bottom of case. Raise cluster gear evenly and carefully, otherwise needle bearings, needle bearing retaining cups,and tool J1449 will fall out of position. Installation has to be made with tool in same position as when it was removed, using counter shaft to push tool from place when completing installation.

REAR TRANSMISSION EXTENSION BEARING



3. The extension is equipped with a steel bronze bushing to support the transmission main shaft. The special bushing is serviced separately from the housing. If replacement is necessary, the bushing may be removed with special tool J1450, and a new bushing pressed in place with the same tool by using the collar. After pressing the bushing in place it must be reamed as shown to provide a running clearance of from .0025" to .004".

REMOVE AND INSTALL REVERSE IDLER SHAFT

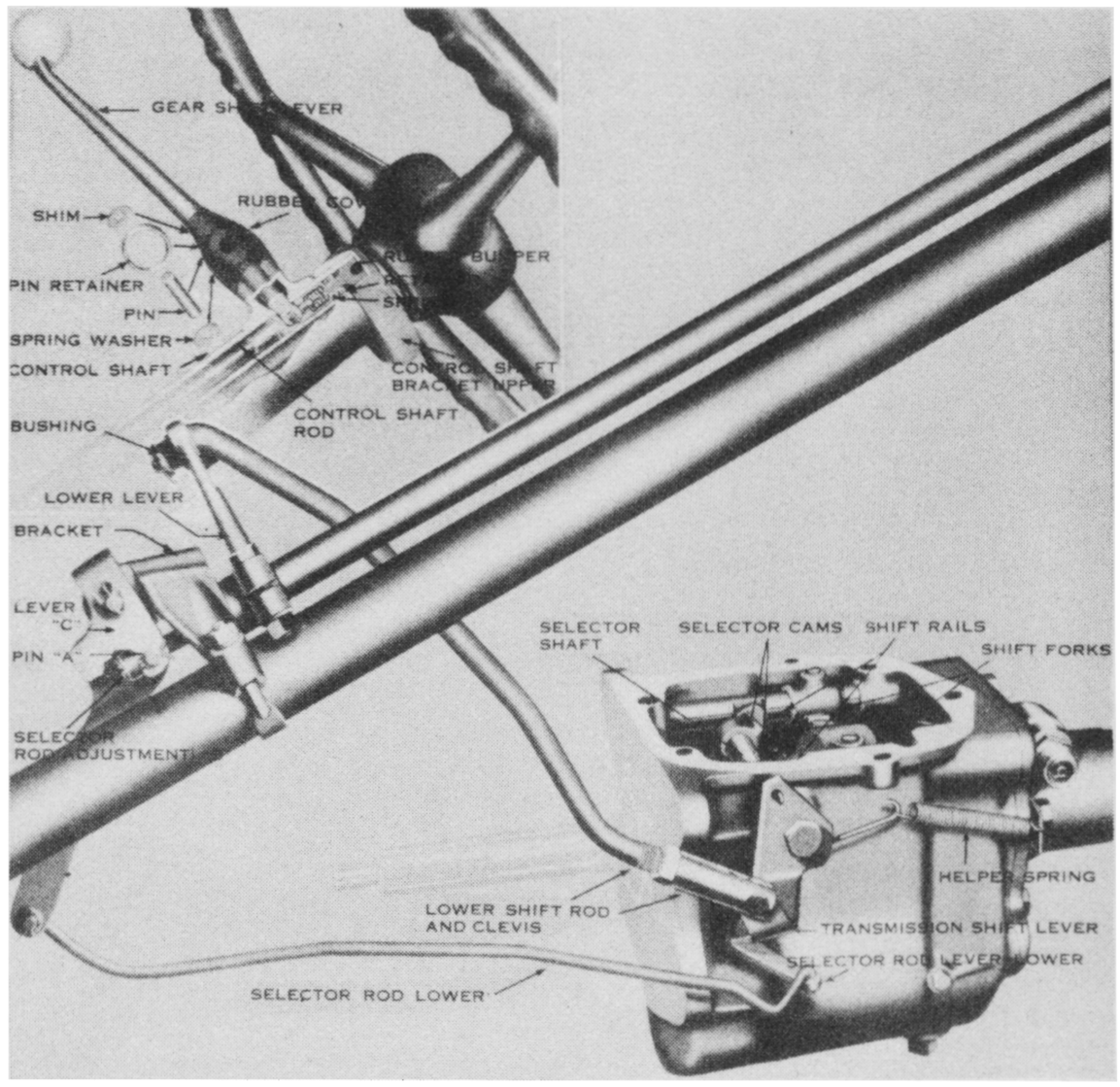


4. The lock screw used in holding the reverse idler shaft in place has been replaced by a pin which is driven through a hole in the side of the case which indexes with a corresponding hole in the shaft.

   To remove the shaft, the pin must be driven into the shaft with a drift punch until it clears the inside diameter of the hole through which the shaft is inserted. The shaft can then be pushed out by hand.

   To install: First remove the pin from the shaft. Insert the shaft in place, making sure holes in shaft and case index. Drive pin through from outside of case until approximately 1/8" of pin enters into the hole in shaft.

ADJUSTING REMOTE CONTROL SHIFT LEVER



Two adjustments are provided to maintain the proper position of the gear shift lever in relation to the steering wheel.

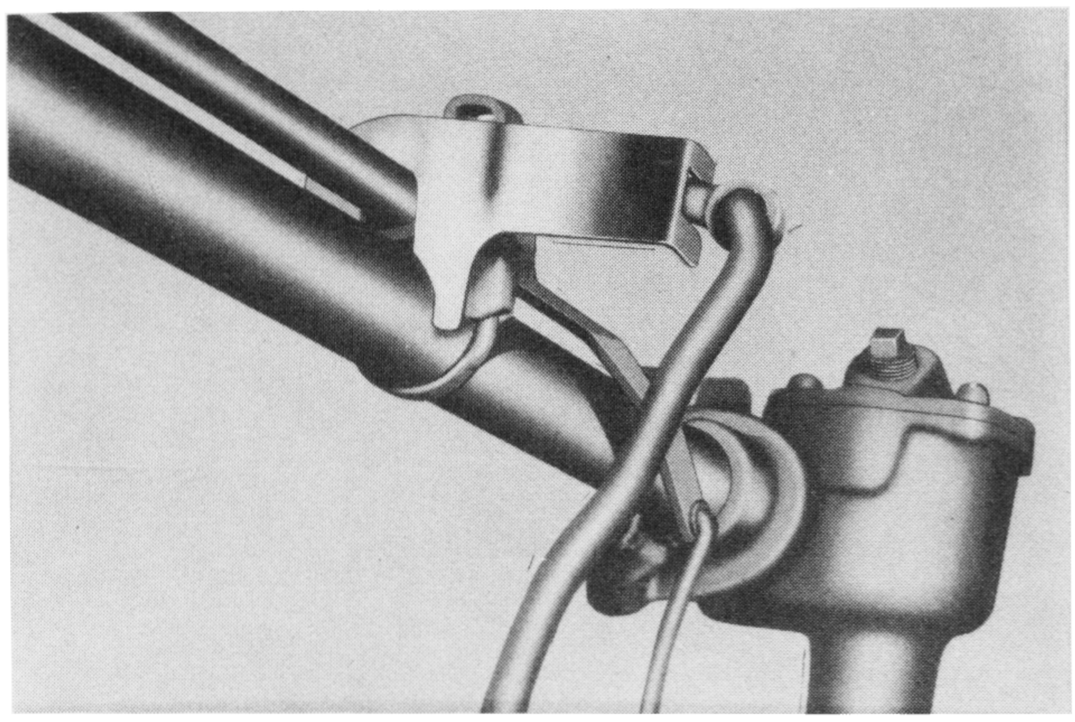
1. Lower selector rod adjustment:

With the transmission in neutral position, the vertical distance between the gear shift lever and steering wheel should be 2-11/16". To adjust this clearance, make sure the lower selector rod is assembled between lower control lever and transmission.

Remove cotter key and through lock pin "A".

Using a short screwdriver, adjust selector adjusting screw "B". Moving up reduces clearance between lever and wheel rim; moving screw down increases the distance. After establishing proper clearance, assemble lock pin "A", making sure it passes through wave washer located inside lever "C" and away from engine side. Washer cannot fall out as pin "A" is removed because the pin immediately above also passes through the washer.

LOWER CONTROL ROD ADJUSTMENT



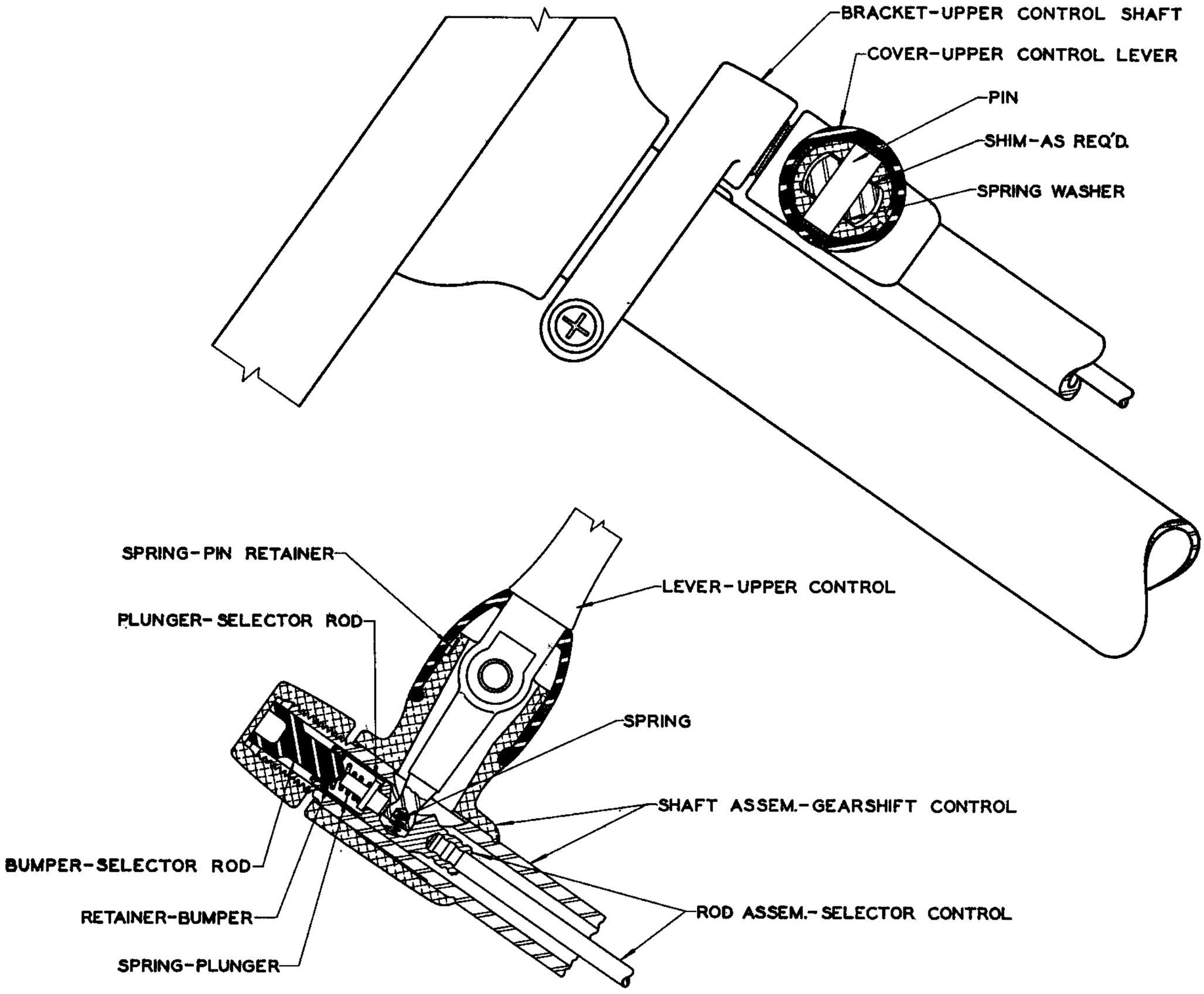
Place transmission gear shift lever in neutral.

Disconnect lower control rod from selector shaft lever by removing clevis pin.

Place gauge J-1445 in position on steering column with upper end of lower control rod in slotted opening in the gauge.

With transmission in neutral and gauge in place, adjust clevis on lower end of lower control rod until clevis pin enters clevis and selector shaft lever freely.

GEAR SHIFT LEVER REMOVAL AND ASSEMBLY



The hand shift lever is held in place by means of a 5/16" pin held in place in turn by a retaining ring and covered by a rubber cover. The pin is pressed through the gear shift control shaft and the gear shift lever. To remove the gear shift lever, slide rubber cover towards outer end of shift lever.

Remove retaining spring.

Remove pin.

To assemble, reverse above sequence of operations.

II

SERVICE CORRECTIONS 1939

AUTOMATIC TRANSMISSION

AUTOMATIC TRANSMISSION TROUBLE AND CORRECTION CHART

Nature of Trouble	Cause of Trouble	Correction Procedure
1. Vibration on accelerator pedal accompanied by loud buzzing sound when car first moves either forward or backward after setting still for a considerable length of time.	Absence of oil in pump or suction pipe.	Install debuzzer package #410878.
2. Transmission will not down shift from 4th to 3rd, or it requires excessive acclerator pedal pressure to make this shift.	Loose body bolts and/ or improper adjusted throttle control lever. Throttle control rod is adjusted too long.	Tighten body bolts and then make throttle control lever adjustment.
3. Down shift 4th to 3rd occurs before increased resistance in accelerator pedal travel is felt.	Loose body bolts and/ or improper adjusted throttle control lever. Throttle control rod is adjusted too short.	Tighten body bolts and then make throttle control lever adjustment.
4. Car fails to move in low or reverse gear.	Improperly adjusted or broken Servo brake.	Make Servo band adjustment or replace band.
5. Transmission fails to shift out of low gear with shift lever in either low or high range.	No oil in transmission, pressure regulator valve tight in body. Oil pump not working. Bad oil leak inside of transmission. Loose rear unit cam operating lever, or rear unit cam relay lever assembly. Broken rear servo band.	Check oil level. See if pressure regulator valve is working properly. Check oil pump with pressure gauge to determine if pump is operating. Pump pressure should be approximately 80 lbs. at 1000 R.P.M. If pressure is low, inspect for leaks at pump or inside of transmission. Replace broken Servo band and check position and operation of rear unit cam operating levers.

AUTOMATIC TRANSMISSION TROUBLE AND CORRECTION CHART

Nature of Trouble	Cause of Trouble	Correction Procedure
6. Bumpy shift from 1st to 3rd or 2nd to 3rd or 4th gear.	Improperly adjusted compensating pressure.	Adjust compensating pressure.
7. Shift from 1st to 3rd gear very severe and bumpy after car is broken in.	Improper throttle control lever adjustment. Defective or scored clutch plates.	Adjust compensating pressure.
8. Shift from 1st to 3rd gear accompanied by slipping within the transmission if the pressure down shift (3rd to 1st) is below 4 M.P.H. Hot oil.	Improper throttle lever adjustment. Defective or worn clutch plates.	Make throttle control lever adjustment. If above adjustment is not effective, change clutch plates.
9. Shift from 1st to 3rd gear accompanied by slipping within the transmission, if the pressure down shift (3rd to 1st) is too high, approximately 8 to 10 M.P.H. A severe hunting or rapid shifting between 1st and 3rd usually accompanies this trouble.	A bad oil leak in the transmission causing the pump pressure to drop when car speed is too high.	Inspect transmission for oil pressure leaks.
10. No automatic upshift or downshift occurring at speeds too high or too low. Shift erratic.	Automatic valve not working properly. Valve may be sticking, stop pin out, or a bind in governor linkage. Faulty or defective governor. No oil pressure.	Free governor linkage and governor valve. Replace governor stop pin if necessary. Check for oil pressure.

OLDSMOBILE'S
1940
HYDRA-MATIC DRIVE

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PART I

ADVANTAGES OF THE HYDRA-MATIC DRIVE

OLDSMOBILE'S
1940
HYDRA-MATIC DRIVE

Several schemes for transmitting the torque developed at the crankshaft of a motor car to the driving wheels through hydraulic couplings are now on the market. With the introduction of the 1940 models, Oldsmobile is the only manufacturer to offer a HYDRA-MATIC DRIVE; that is, a highly efficient fluid drive in combination with a fully automatic transmission. The HYDRA-MATIC DRIVE is a completely new method of automatically combining a fluid drive with various combinations of gearing.

The old short-comings of fluid drives; namely

1. too much creep under engine idle conditions, or

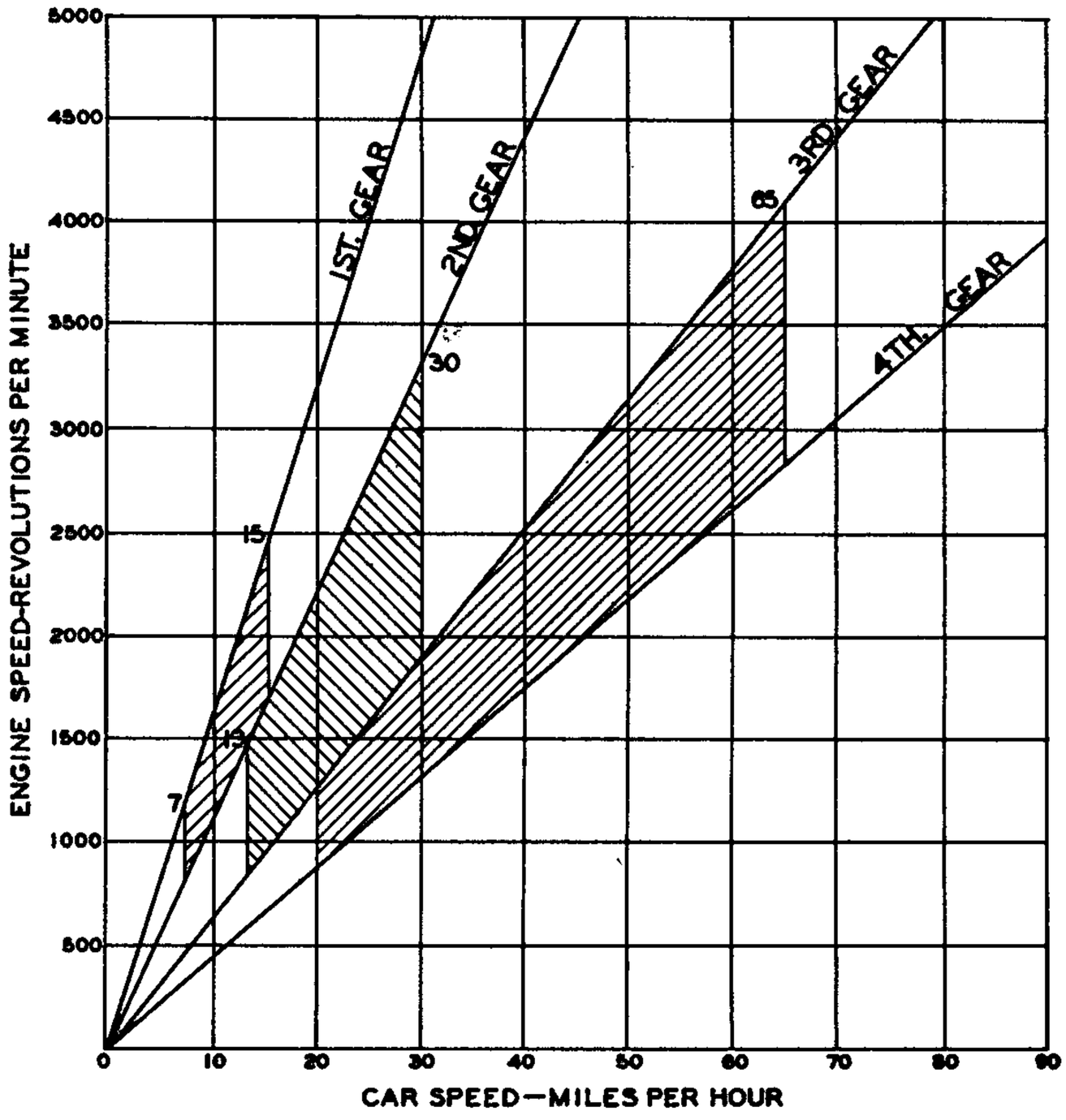
2. excessive slip under normal high gear driving conditions has been overcome with Oldsmobile's new HYDRA-MATIC DRIVE.

PERFORMANCE

ACCELERATION - 5 M.P.H. START - FOR 10 SECONDS

Car Model	Standard Speed	Standard Dist.	Automatic Speed	Automatic Dist.
60	30	225	34	285
70	31	265	35	295
90	33	280	37	310

OLDS HYDRA-MATIC DRIVE
SHIFTING RANGES



The "High" Range including a 1st, 2nd, 3rd and 4th (direct) gear ratio is used under all normal driving conditions. With the shift lever in the "High" range, when the car is accelerated, the gear ratios are automatically changed at the speed best suited for the immediate road conditions. This provides flashing acceleration and performance. Except for reverse operation, the "High" Range can be utilized for most driving conditions inasmuch as gear shifting is completely automatic.

The "Low" Range of the transmission, which includes a 1st and 2nd gear ratio only is a convenience range particularly adaptable for:

Deceleration on steep hills.

Climbing hills which are so steep that third gear gives insufficient power.

Pulling through soft sand or mud.

GASOLINE DATA

Gasoline Economy

	Std.	Auto.	Std.	Auto.	Std.	Auto.
30 M.P.H.	22	+ 2	22	+2	20	+2
50 M.P.H.	19	+ 1½	18	+1½	16	+1½

Gasoline economy, with the car in "High" Range 4th gear is greater because the number of engine revolutions is reduced approximately 20% in both city and country driving. Increased economy will also be noticeable because the accelerator pedal need be depressed only once when starting the car in motion, as compared to the conventional car in which each time a change of gears is made the accelerator is depressed and a shot of gasoline is forced to the engine through the accelerator pump.

HILL CLIMB—11.6%—10 M.P.H. START

Car Model	Standard Time (Sec.)	Standard Speed at Top	Automatic Time (Sec.)	Automatic Speed at Top
60	38	35	35	38
70	36	37	32	41
90	35	37	31	42

The above data will show the efficient operation of the engine and the advantages through shifting of the gears automatically at a point where the engine is operating nearer its power peak. This advantage applies in all gears - 1st, 2nd, 3rd and 4th.

Other important advantages of the new HYDRA-MATIC DRIVE are as follows:

Full automatic gear shifting.

No clutch pedal operation.

Greater gasoline economy.

Greater oil economy.

Reduction in engine revolutions.

Greater acceleration.

Increased flexibility at all speeds.

Smoother, quieter engine operation.

Longer engine life.

Increased convenience - simplification of driving technique.

One forward position of shift lever for all kinds of driving.

The only car with a Fluid Flywheel and Full Automatic Transmission.

No stalling of engines.

Less skidding on accelerations and decelerations on slippery roads.

PART II

HYDRA-MATIC DRIVE

DRIVING INSTRUCTIONS

OLDSMOBILE HYDRA-MATIC DRIVING INSTRUCTIONS

1. Move shift lever under steering wheel to Neutral position.

2. Turn ignition key to "On" position.

3. Start engine by stepping on starter button.

4. Release hand brake if applied.

5. Move shift lever to"High" position if the car is to move forward,and depress accelerator pedal lightly.

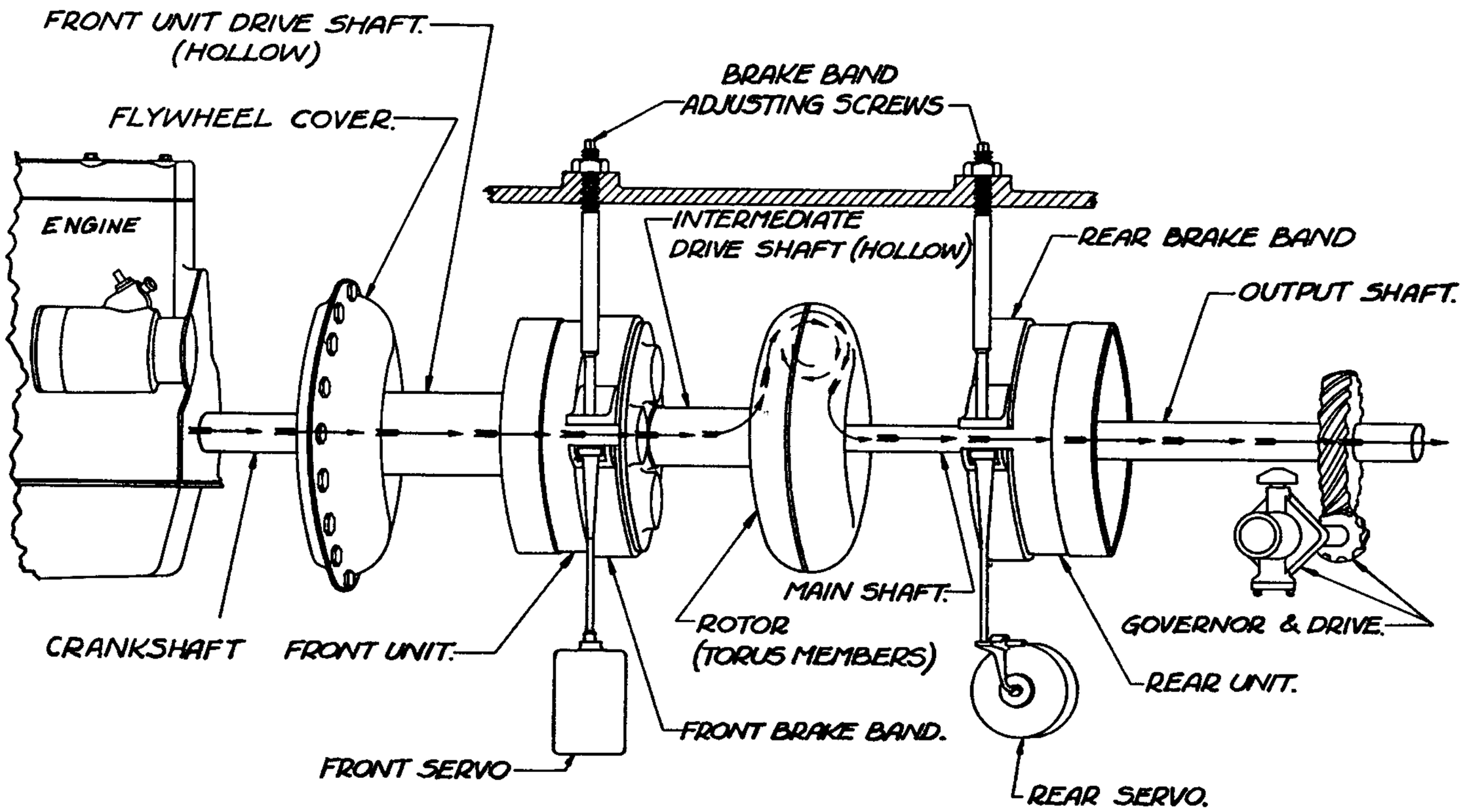
Note: Car can be stopped for a stop street for example, by simply depressing brake pedal Transmission shift lever can remain in "High" position. To move forward again, step on accelerator.

6. To Reverse direction of car, car not in motion and engine idling, raise shift lever slightly and move to Reverse position in one continous motion.

PART III

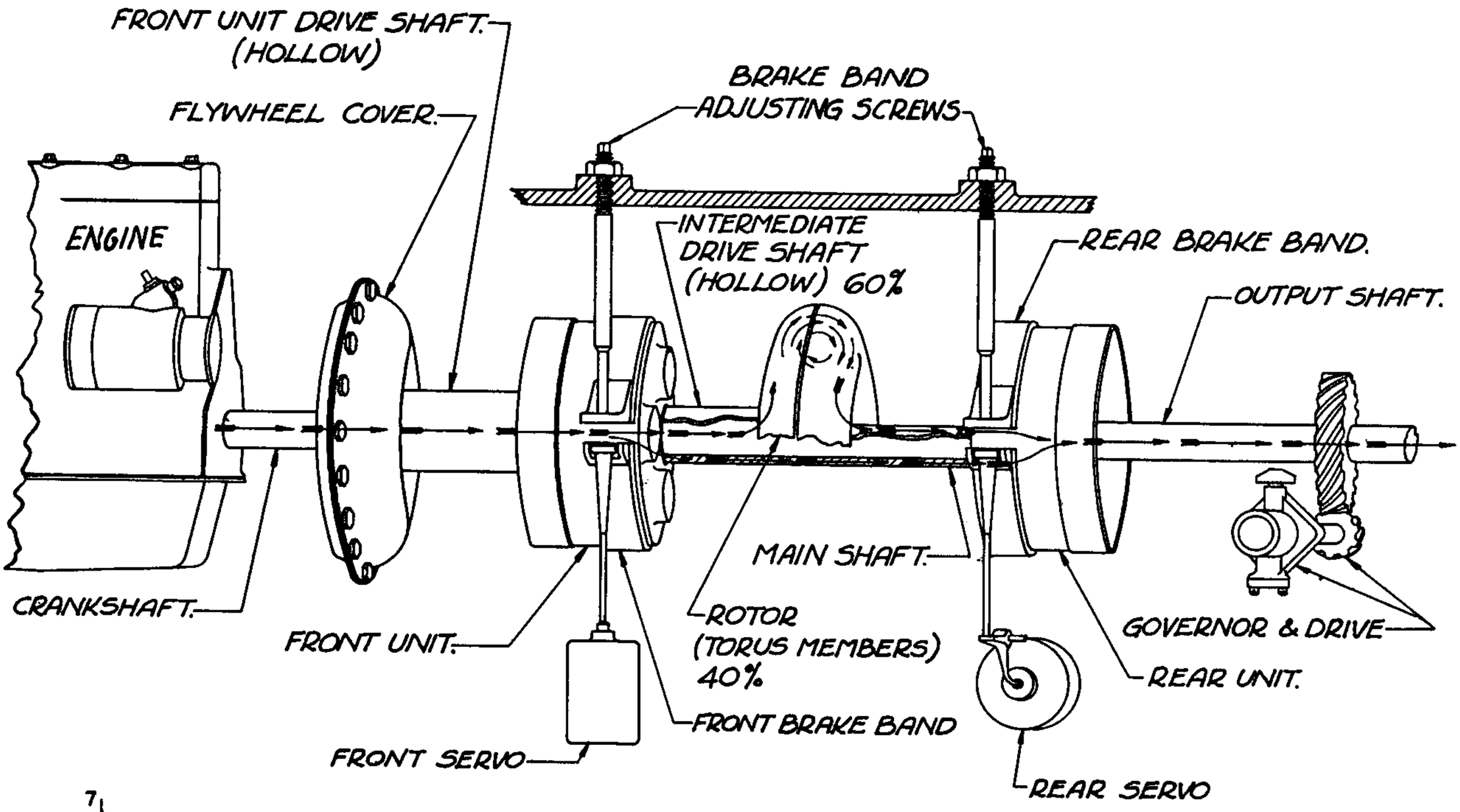
OPERATING PRINCIPLES OF THE FLUID COUPLING

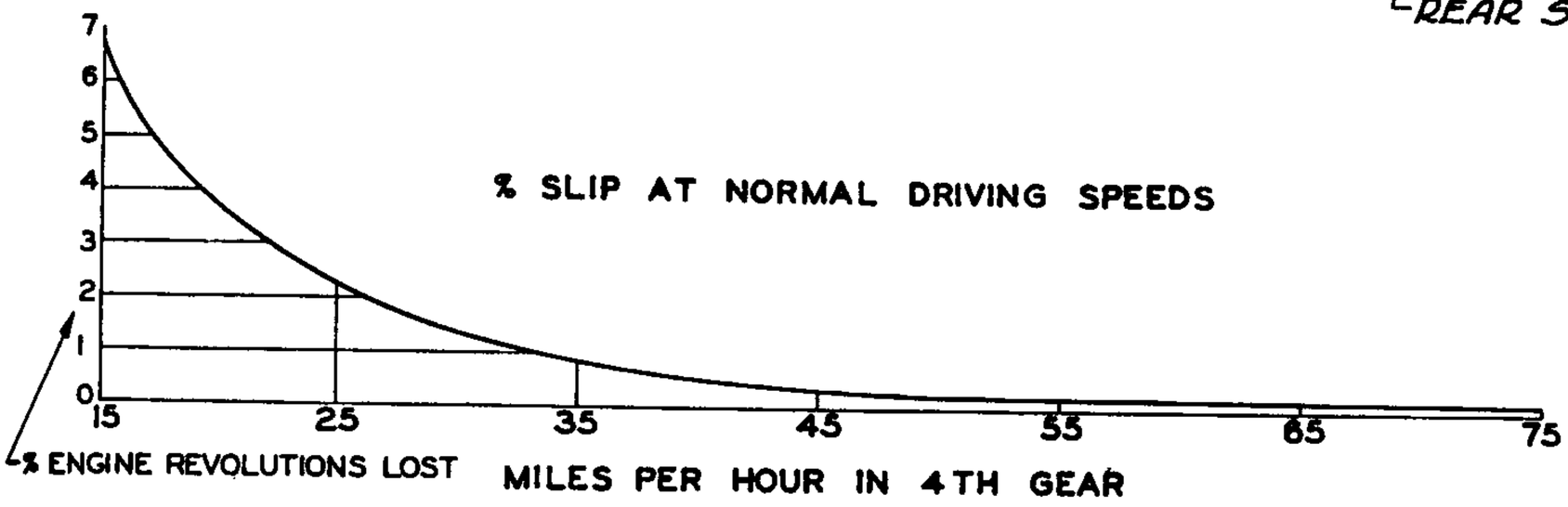
POWER DRIVE FIRST AND SECOND



Creep, under engine idle conditions is minimized by locating the fluid members in effect between the front and rear units of the transmission where the speed of the fluid driving member has first been reduced to .7 engine speed by passing through the gear reduction of the front planetary.

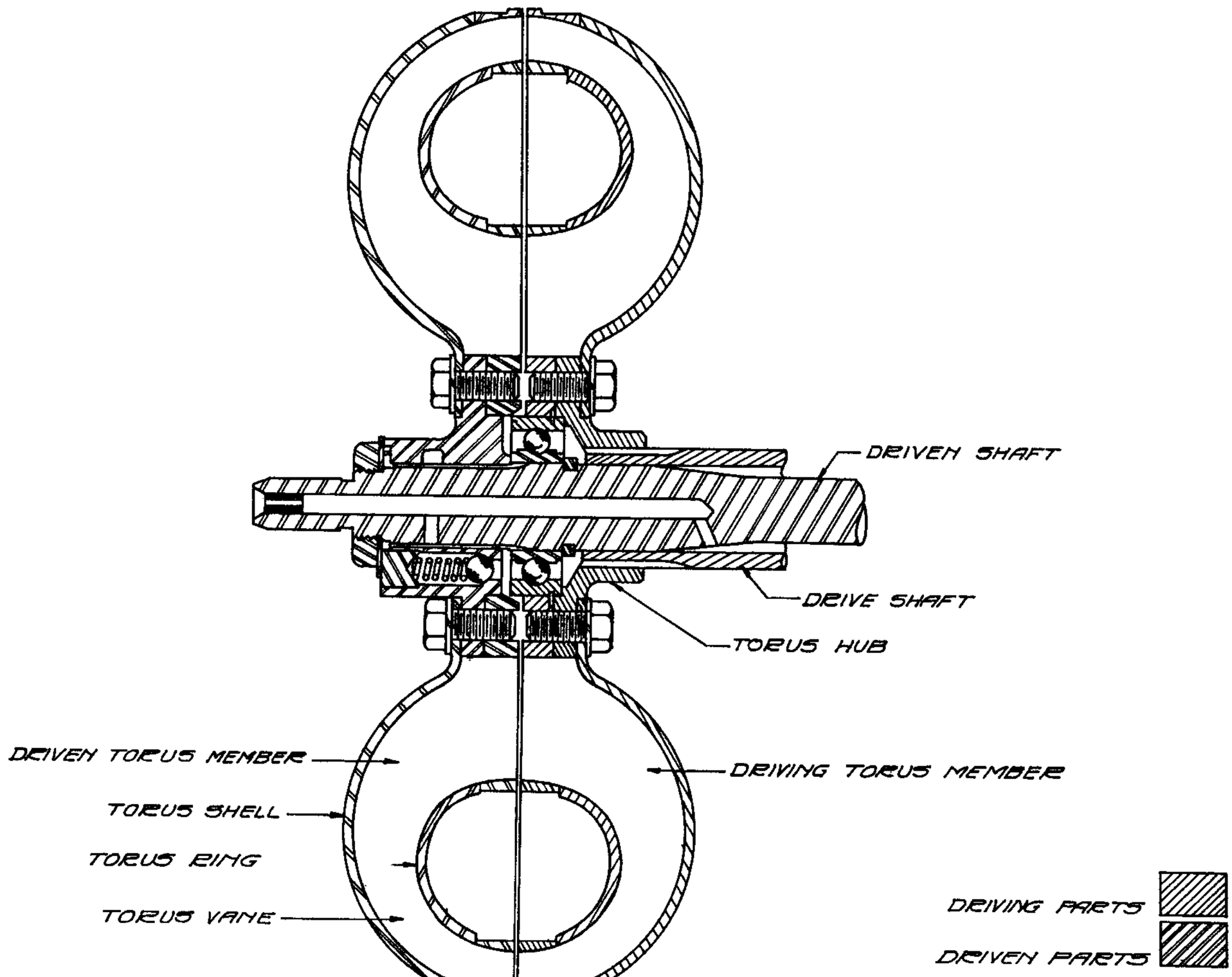
POWER DRIVE THIRD AND FOURTH





Excessive slip under normal driving conditions is undesirable because of the resultant losses in power and the reductions in fuel economy. The flow of power through the device is such that slip is kept at a minimum. This is accomplished by a design in which only 40% of the torque is transmitted through the fluid drive. The details of this will be explained later. Thus, in 4th gear, the slip through the HYDRA-MATIC Drive is less than 1% over a large part of the driving range. This result is accomplished by the particular arrangement of the fluid drive with respect to the planetary units.

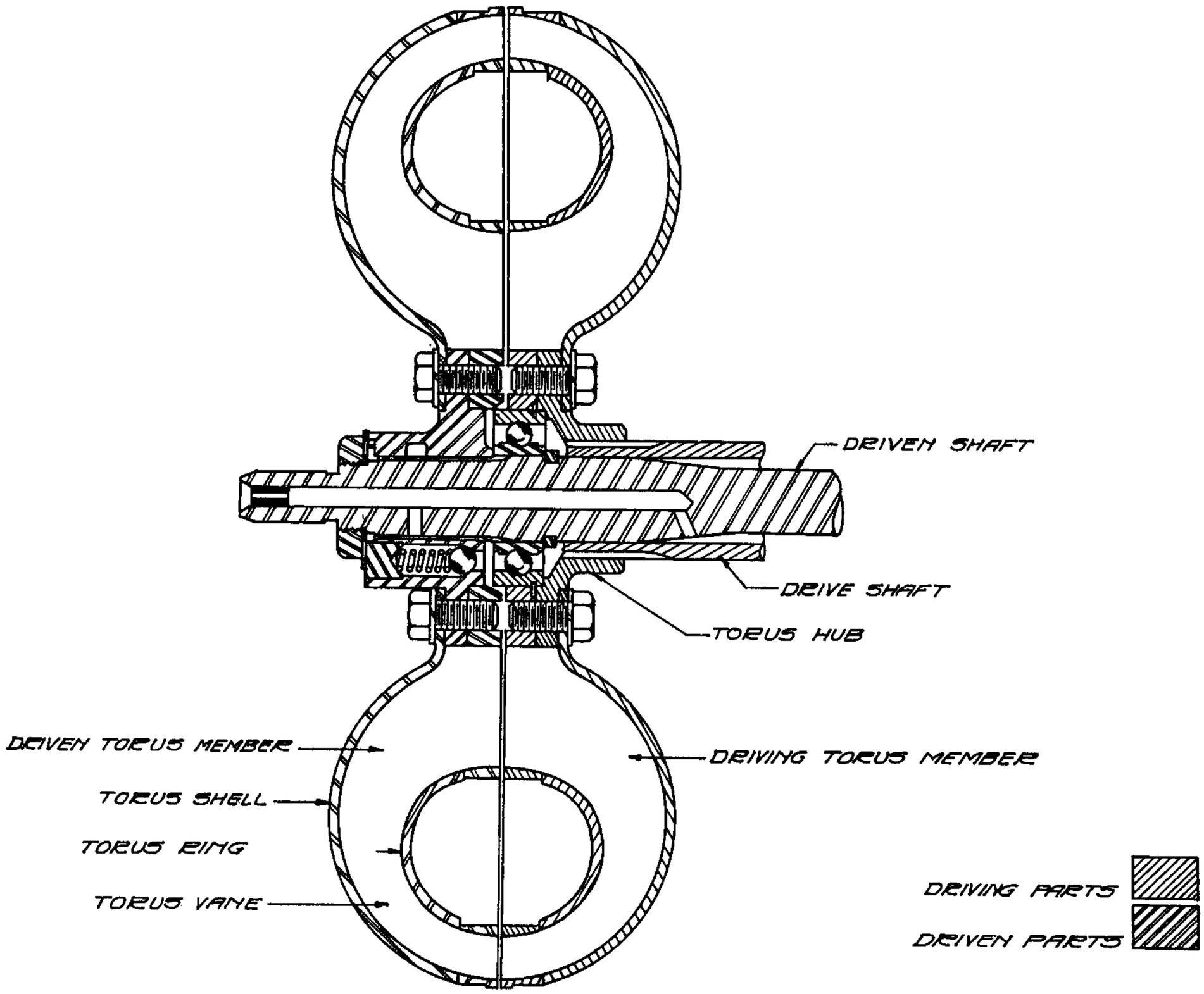
TORUS MEMBER CONSTRUCTION



The fluid unit of the HYDRA-MATIC DRIVE is composed of two rotors or "torus members"; each splined to an independent shaft.

One member is known as the "drive" member; the other as the "driven" member. Both members are identical in construction save for the hub which serve to secure the members to their respective shafts. The fluid coupling makes for a softness of feel not possible with a mechanical drive. Because of this fluid coupling no torsional disturbances are transmitted from the engine to the drive line and hence up into the body.

TORUS MEMBER CONSTRUCTION



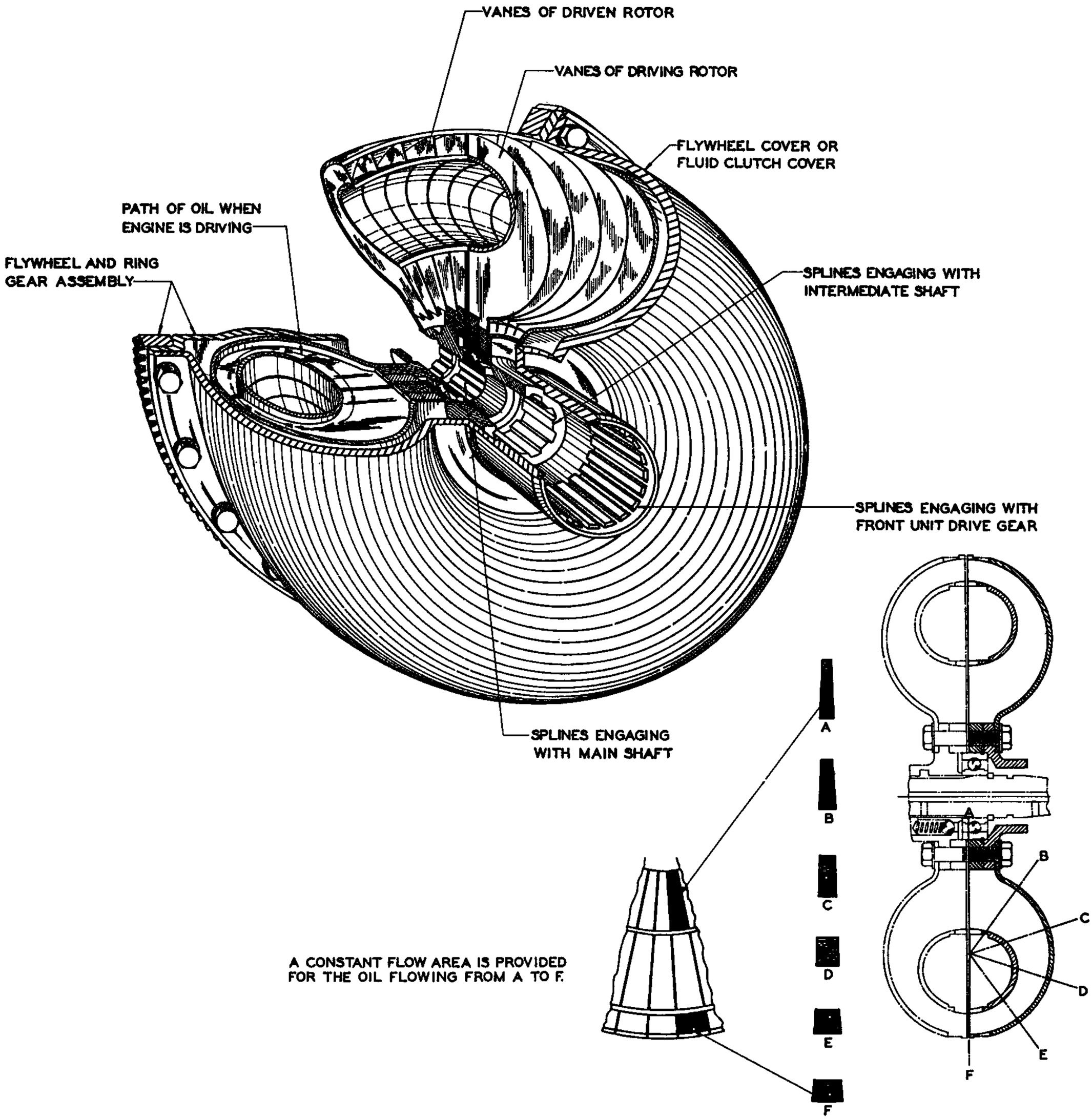
The principal parts are:

Torus shell
Torus ring
Torus vanes
Torus hub

The function of the driving torus member is to impart centrifugal force to the oil within this member, and to direct the flow of oil so that its energy is most efficiently transmitted from the driver to the driven torus member. This function is achieved in the following manner:

Under action of centrifugal forces, due to rotation of the driving torus member, the oil contained therein tends to move radially outward, the tendency increasing with rotating speed.

TORUS MEMBER OPERATION


VANES OF DRIVEN ROTOR
VANES OF DRIVING ROTOR
FLYWHEEL COVER OR FLUID CLUTCH COVER
PATH OF OIL WHEN ENGINE IS DRIVING
FLYWHEEL AND RING GEAR ASSEMBLY
SPLINES ENGAGING WITH INTERMEDIATE SHAFT
SPLINES ENGAGING WITH FRONT UNIT DRIVE GEAR
SPLINES ENGAGING WITH MAIN SHAFT
A
B
C
D
E
F
A CONSTANT FLOW AREA IS PROVIDED FOR THE OIL FLOWING FROM A TO F.

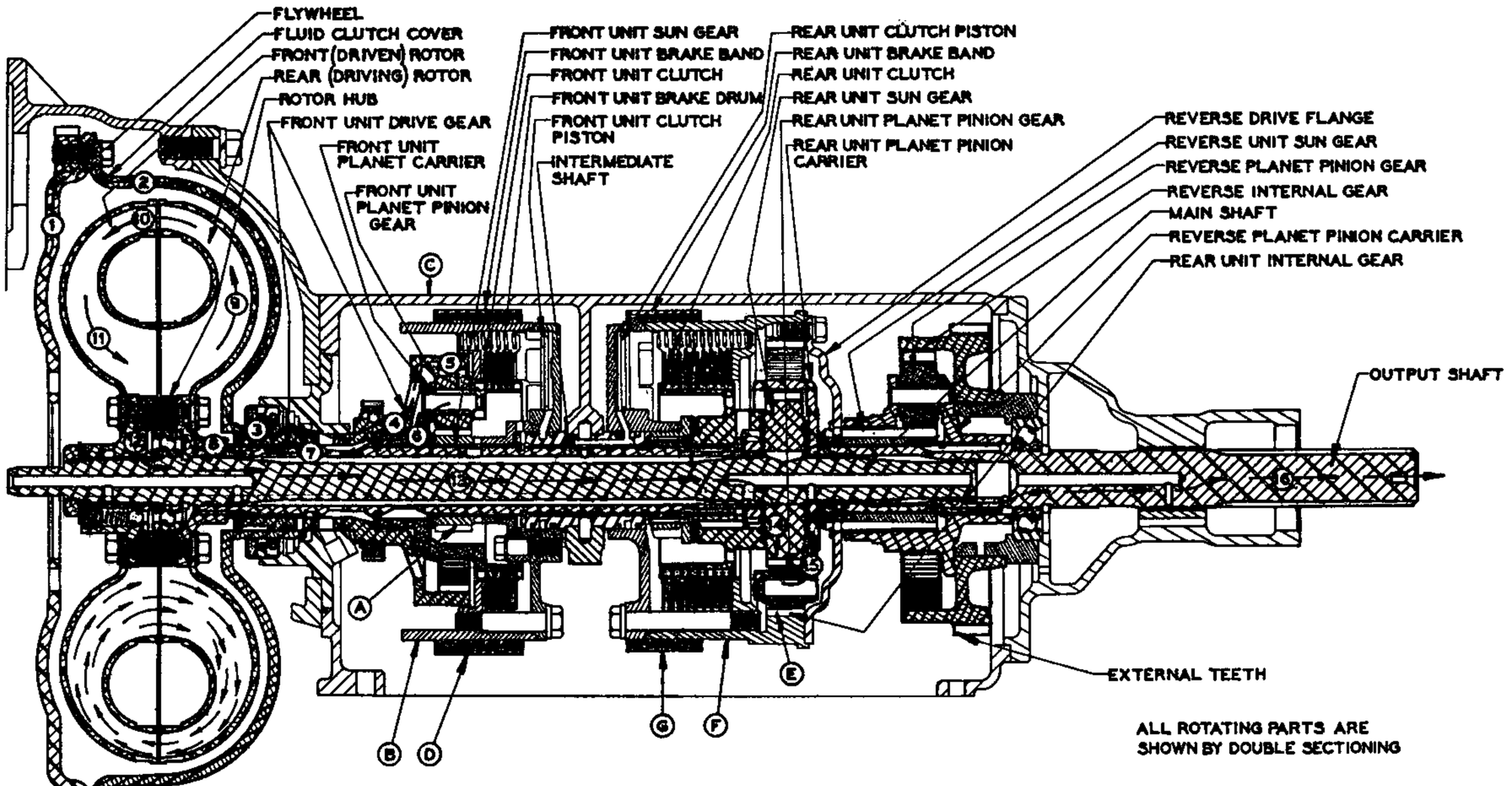
As the oil is forced to the outer extreme of the housing, it must cross over to the driven torus and as it does this a driving force is set up in this driven member.

The shape of the torus ring and the area of the passage between the torus vanes have been carefully designed to give the least possible restriction to the flow of oil through the torus and thus insure maximum efficiency and freedom from slip.

PART IV

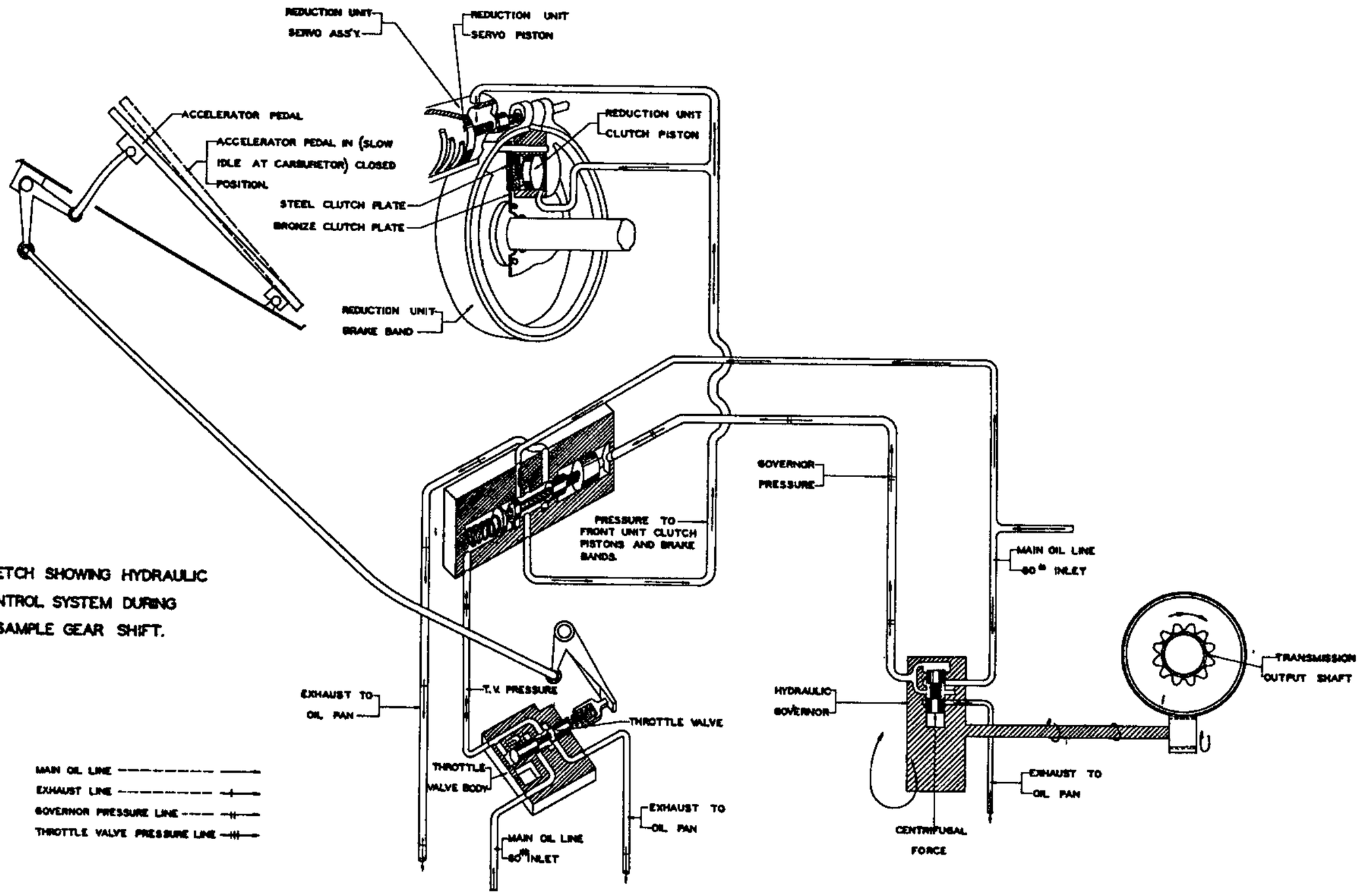
THE HYDRAULIC CONTROL OF THE HYDRA-MATIC DRIVE

THE HYDRAULIC CONTROL



A complete description of the detailed occurrences within the entire hydraulic control system of the new HYDRA-MATIC DRIVE would lead to unnecessary complexities, hence a simple schematic diagram is being presented to aid in an explanation of the shift controls. The hydraulic control system has as a functional duty the supplying of necessary oil pressure at the proper time to actuate the clutch pistons and brake bands of the planetary units. It thereby hydraulically controls the various changes in gear ratios.

THE HYDRAULIC CONTROL

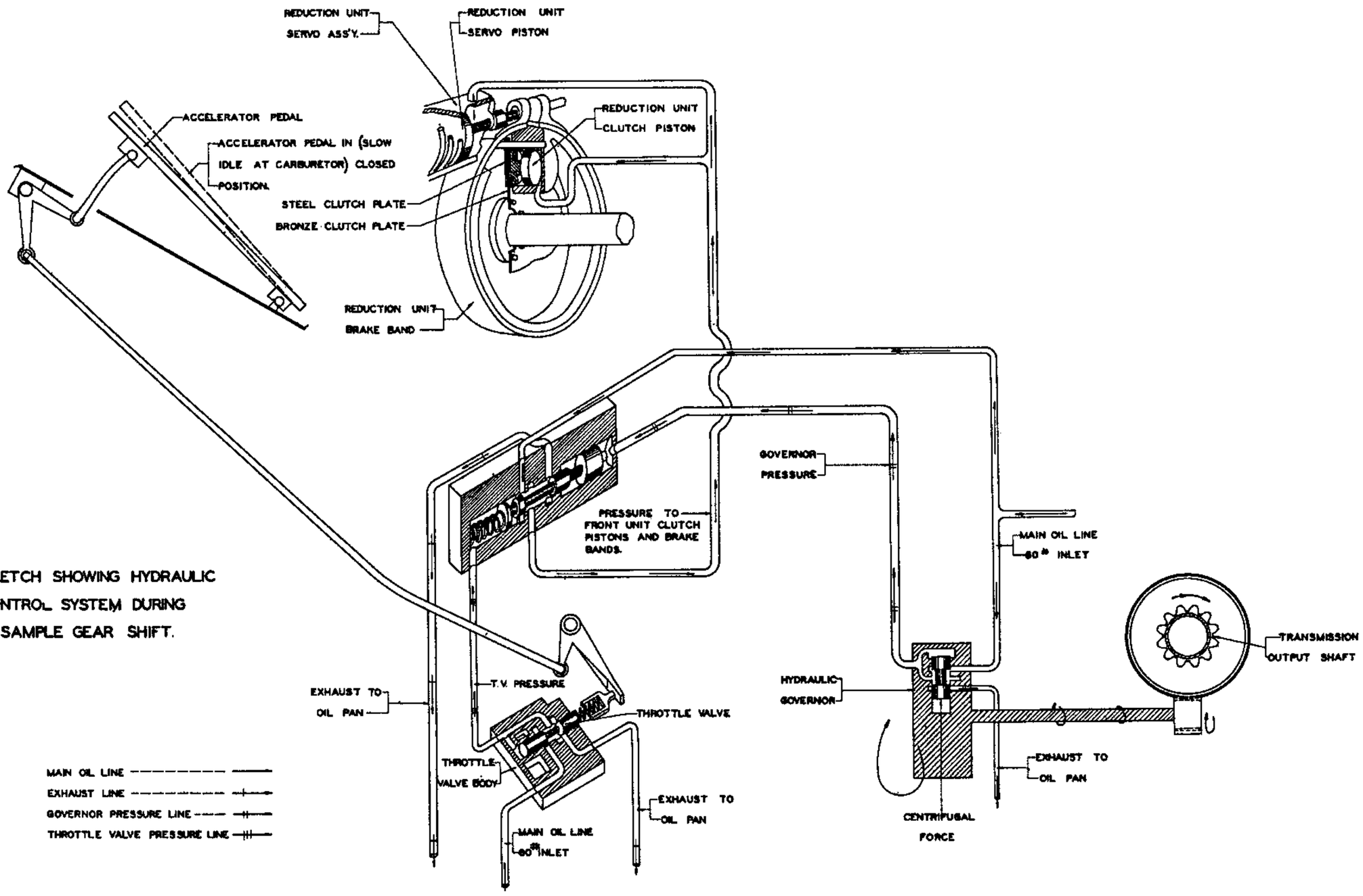


SKETCH SHOWING HYDRAULIC CONTROL SYSTEM DURING A SAMPLE GEAR SHIFT.

The control system is basically a system of balanced valves; that is, oil is admitted to the various valves and regulated between inlet and exhaust openings to exactly balance some variable force which may be spring pressure as in the case of the throttle valve or centrifugal force as in the case of the governor valves.

Referring to the diagram, oil is admitted to the governor valve body through the 80# line from the pump. As the governor spins, centrifugal force so positions the governor valve that a port is opened and some of this oil is admitted to the valve itself in such a way that pressure is built up to oppose the centrifugal force acting on the valve.

THE HYDRAULIC CONTROL

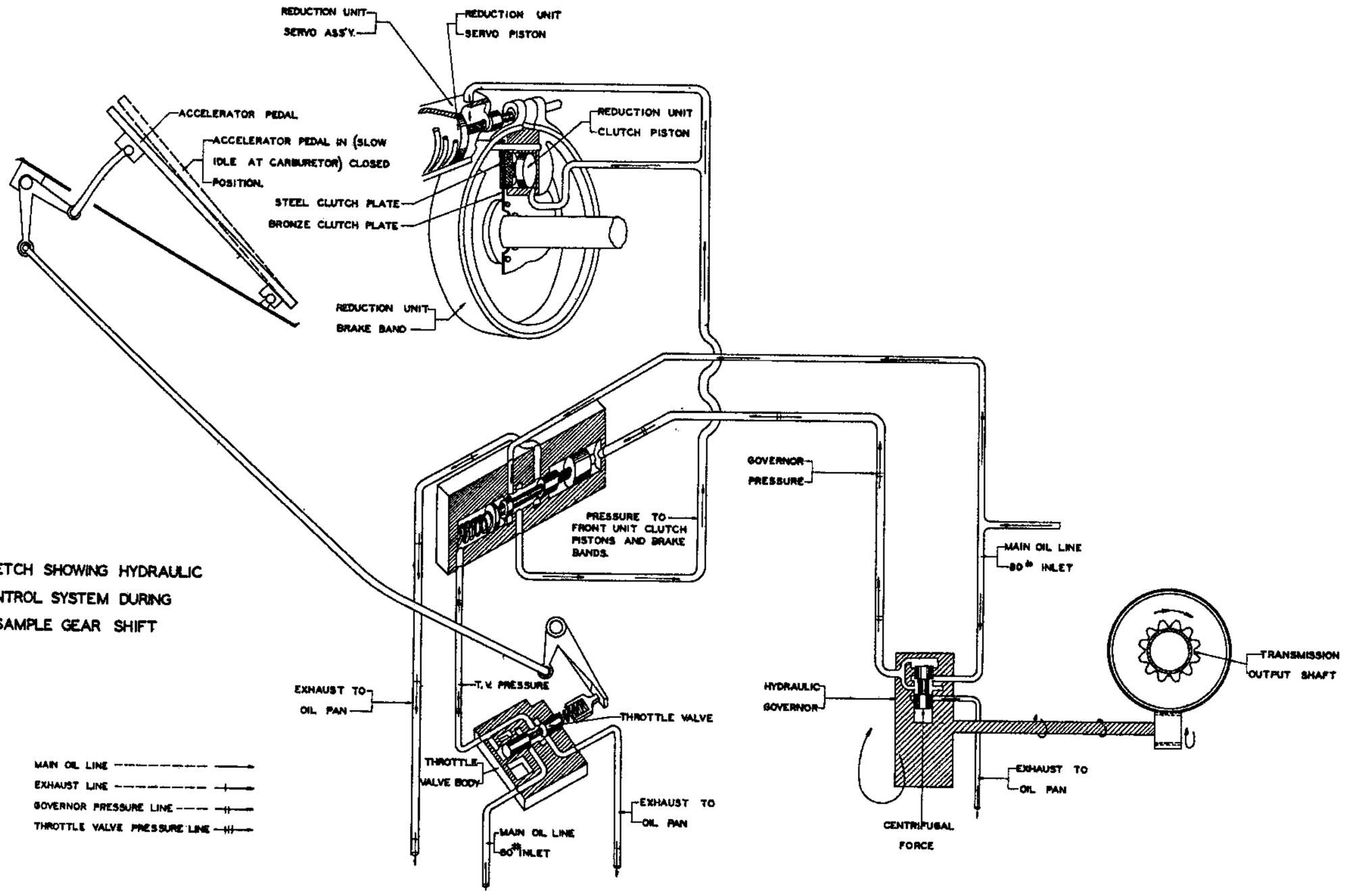


SKETCH SHOWING HYDRAULIC CONTROL SYSTEM DURING A SAMPLE GEAR SHIFT.

This results in a governor pressure which increases with car speed. (The governor is driven by the transmission output shaft). This governor pressure is applied to one end of a shifting valve; for example, the valve which shifts the transmission between 3rd and 4th gear. On the opposite end of this valve is applied a fixed spring pressure and another variable pressure known as throttle valve pressure.

This pressure is regulated by throttle position which actuates another balanced valve as shown in the sketch. When force exerted by governor pressure on the 3rd to 4th valve exceeds that exerted by throttle valve pressure plus spring on the opposite end, the

THE HYDRAULIC CONTROL

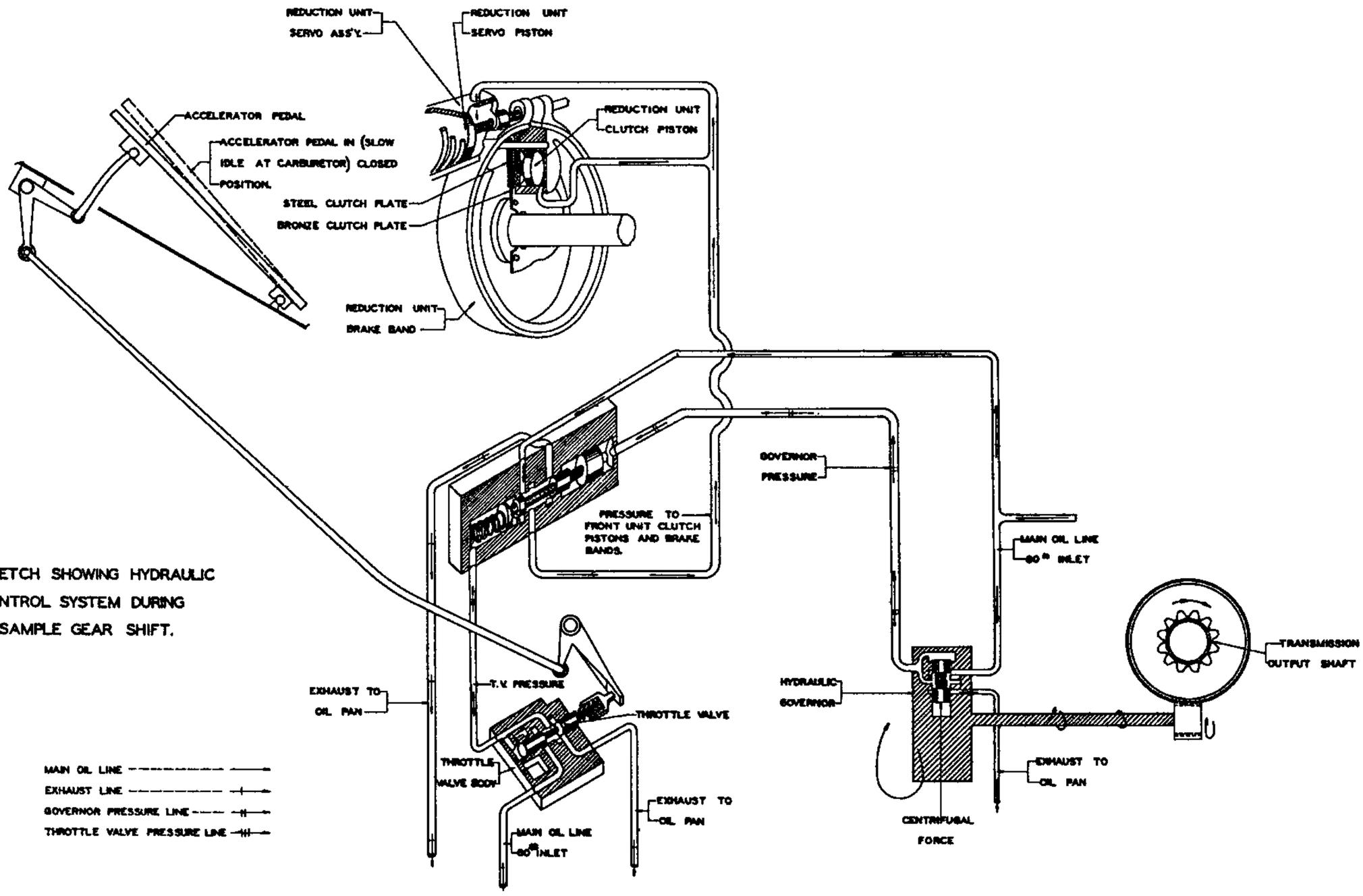


SKETCH SHOWING HYDRAULIC CONTROL SYSTEM DURING A SAMPLE GEAR SHIFT

valve shifts and oil is directed to the front unit clutch pistons and the brake release piston of the front unit servo. This shifts the transmission from 3rd gear to 4th, and occurs at approximately 20 M.P.H. at light throttle.

If the throttle is opened, the throttle valve pressure is increased. Thus, before the shift can be made under these conditions, governor pressure must be increased. This can be accomplished only by raising the car speed. Therefore, varying throttle opening results in a 3rd to 4th shift over a wide speed range. At full throttle, this shift is made at approximately 65 M.P.H.

THE HYDRAULIC CONTROL

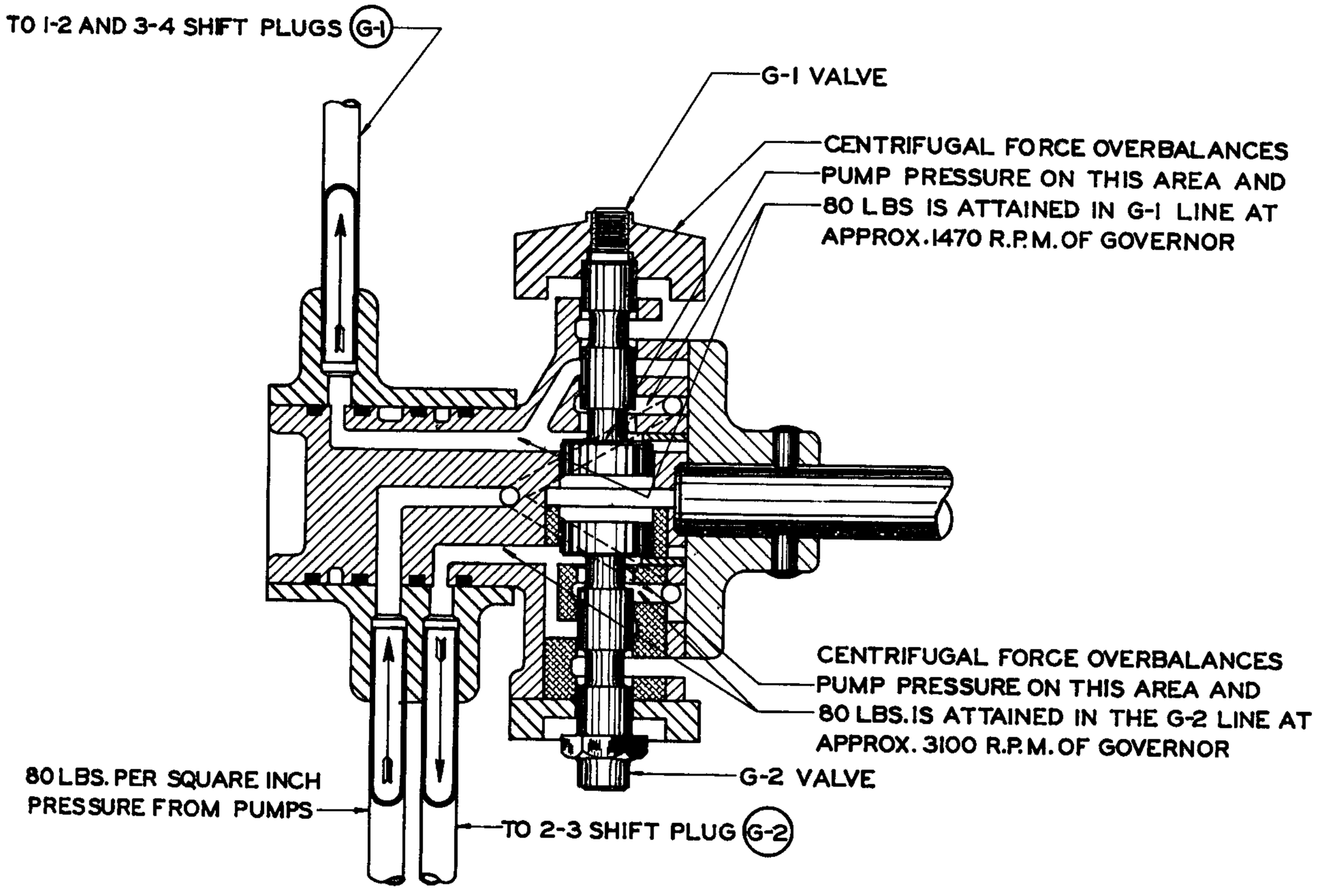


SKETCH SHOWING HYDRAULIC CONTROL SYSTEM DURING A SAMPLE GEAR SHIFT.

This explanation is representative in a general way of all of the forward shifts possible with the transmission, although it is not possible to make throttle downshifts as described above in all gears because of certain restrictions placed in the device.

To shift from 4th to 3rd below 60 M.P.H., requires that the force from throttle valve pressure plus spring exceed that of governor. Under these conditions, oil pressure is cut off from the clutch pistons and brake release piston and the brake apply piston applies the front unit brake. Opening the throttle wide provides the necessary force on the shifting valve to accomplish this change from 4th to 3rd gear.

THE GOVERNOR


TO 1-2 AND 3-4 SHIFT PLUGS G-1
G-1 VALVE
CENTRIFUGAL FORCE OVERBALANCES
PUMP PRESSURE ON THIS AREA AND
80 LBS IS ATTAINED IN G-1 LINE AT
APPROX. 1470 R.P.M. OF GOVERNOR
CENTRIFUGAL FORCE OVERBALANCES
PUMP PRESSURE ON THIS AREA AND
80 LBS. IS ATTAINED IN THE G-2 LINE AT
APPROX. 3100 R.P.M. OF GOVERNOR
G-2 VALVE
80 LBS. PER SQUARE INCH
PRESSURE FROM PUMPS
TO 2-3 SHIFT PLUG G-2

GOVERNOR RUNNING ABOVE 3100 R.P.M.

It should be noticed in passing that the governor consists of two valves, one of which builds up pressure very rapidly and the other of which builds up more slowly. This results in more flexibility of control than is possible with a single stage governor. Shifts between 1st and 2nd gear are actuated by that stage of the governor in which the rate of pressure build up is more rapid, while shifts between 2nd and 3rd and 3rd and 4th utilize both stages.

PART V

MECHANICAL OPERATION OF THE AUTOMATIC TRANSMISSION

Before starting to describe how the shifting of the new Oldsmobile HYDRA-MATIC transmission is accomplished, it may be best to explain the gear ratios that are available, and then explain how these gear ratios are obtained.

In the new HYDRA-MATIC Transmission there are two forward speed ranges and one reverse gear.

The first forward speed range is known as the "high" and the other as "low". When in "high" the transmission will operate either in 1st-2nd-3rd or 4th gear. 4th gear is a direct drive of the engine to the rear wheels. When in "low" the transmission will operate either in 1st or 2nd gear depending on speed and throttle opening.

The shift from "neutral" position to "high" is similar to that of the automatic transmission from neutral to "low" in that the lever is moved to the first forward position.

In the automatic transmission a sliding gear was made to engage manually with a clutch gear or a reverse idler gear.

There are no sliding gears to engage in the HYDRA-MATIC DRIVE the gears being in mesh at all times and the power drive forward being controlled by positioning of a valve or reverse by positioning of a pawl, together with a valve.

The shift lever can be moved to any position manually. When shifting from "neutral" to reverse it is necessary to pass the lever through the "high" and "low" position and then lift slightly on the shift lever. The shift lever should be moved from low into reverse with a continuous motion to prevent undue clashing. The latch between low and reverse prevents the lever being placed in "reverse" position unintentionally. There is no latch in the other shifts.

To start the car in forward motion, the instructions are as follows:

lst-with shift lever in neutral, turn on the ignition key and start the engine.

2nd-move the shift lever to the first forward position "high" range.

3rd-step on the accelerator.

The car will now move forward smoothly in lst gear and will automatically shift into 2nd, 3rd, and 4th (direct drive).

At this point let it be explained again that the normal operating position is the first forward position or "high" range. With the shift lever moved to "high" the car will start in lst gear and shift automatically into 2nd gear at approximately (7 to 15 M.P.H.). Then into 3rd gear at approximately (13 to 30 M.P.H.). The shift into 4th gear (direct drive) will be made at approximately (20 M.P.H.) at light throttle to (65 M.P.H.) (Full Throttle). The speed at which all shifts occur depends on accelerator pedal position.

When the car is started in the "low" range position and the driver continues to accelerate at part throttle, the transmission will automatically shift from lst to 2nd gear at about (7 M.P.H.). If the throttle is opened wide, this upshift will occur at (23 M.P.H.). The car will continue to operate in 2nd gear unless the car speed drops below (5 M.P.H.), in which case the transmission will downshift into lst gear again.

To shift from "high" range to "low" range, car moving. This shift is made by manually moving the shift lever from "H" to "L" range position and the actual shift occurs only when the car speed falls below 42 M.P.H. This shift presents a means of obtaining additional braking effort from the engine when descending long steep grades, and is comparable to shifting from high to 2nd gear in the conventional transmission.

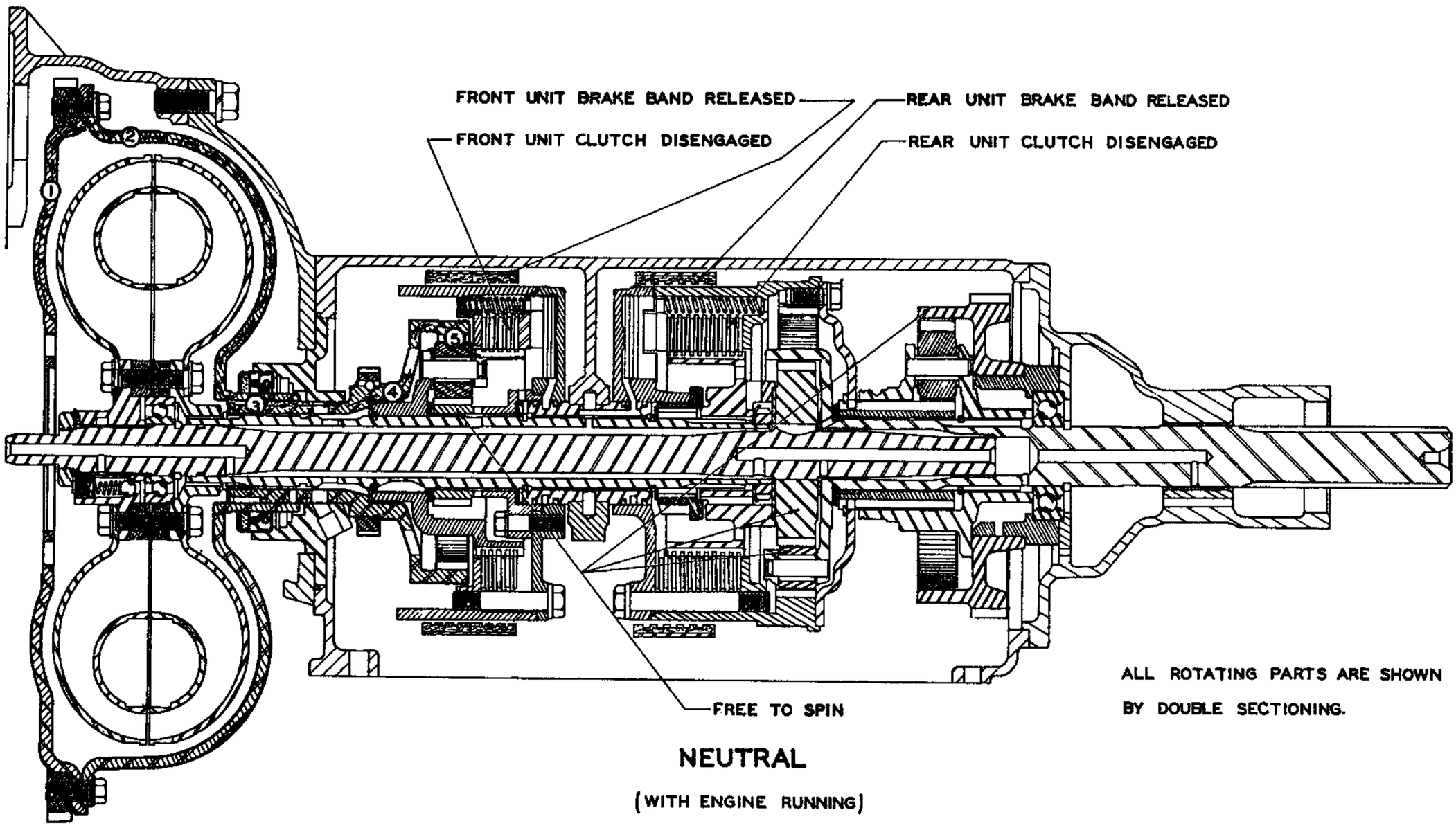
On deceleration with closed throttle the shift from 4th to 3rd gear occurs automatically at 12-13 M.P.H. Continuing to decelerate, the transmission will shift automatically from 3rd to 1st at 3-4 M.P.H.

Shifting from 4th to 3rd gear for increased acceleration can be accomplished below 60 M.P.H. by merely pressing the accelerator pedal to the floor. By this action the throttle valve pressure is increased to a point where it overcomes the governor pressure acting on the 3 to 4 valve to hold the 3 to 4 valve open. Therefore, the valve is moved to a position such that clutch pressure and brake release pressure to the front unit are cut off and the brake apply pressure allows the front band to come on.

In like manner at speeds below 11 M.P.H. a downshift from 3rd to either 2nd or 1st gear may be made.

To reverse direction of the car, (car not in motion) with the engine idling, move the shift lever through the "Hi" and "Lo" position, than with a slight lift on the lever move it into the "R" position. Move the lever from "Lo" to "R" in one continuous motion to prevent clashing.

NEUTRAL—ENGINE IDLING

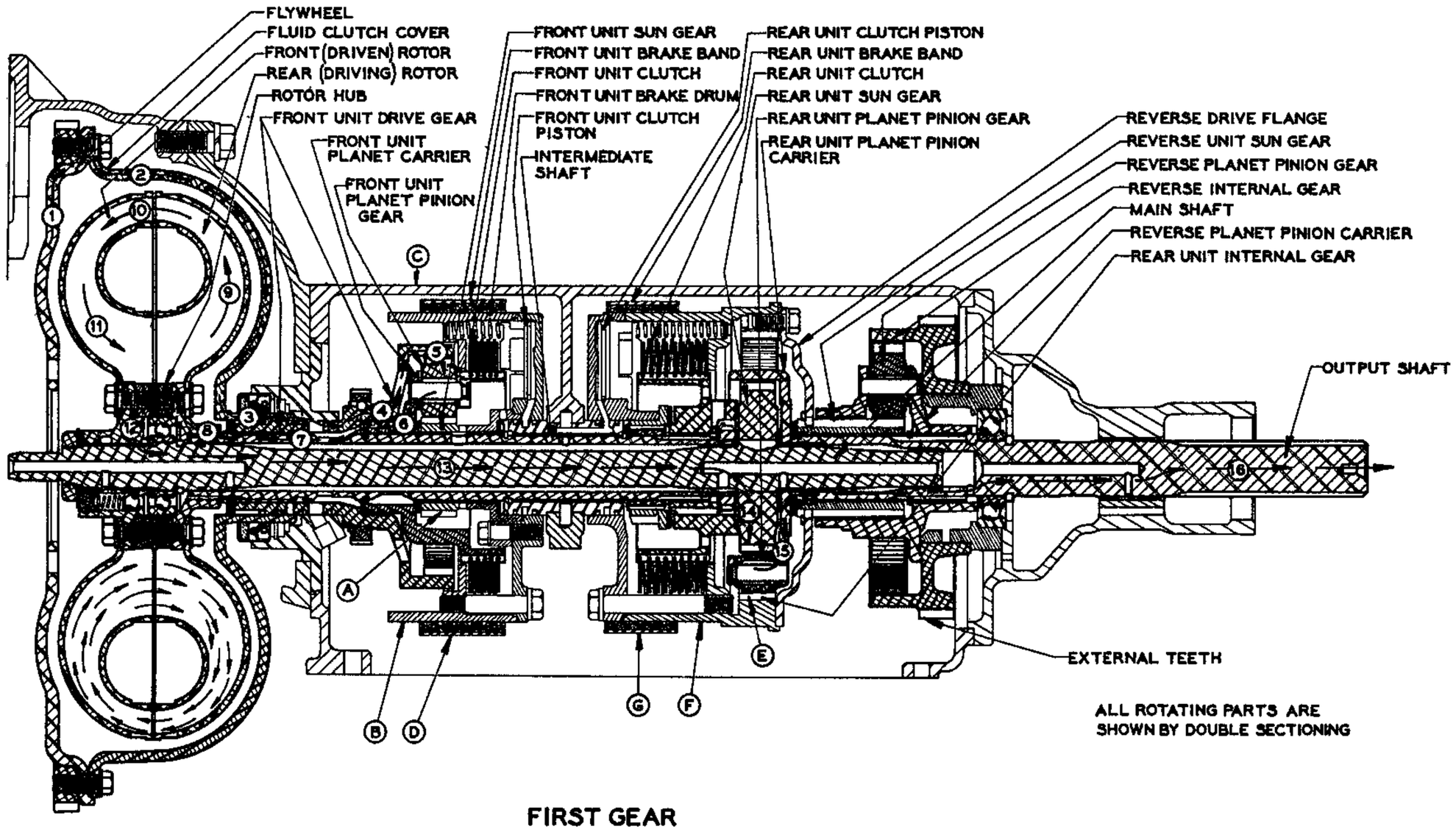

FRONT UNIT BRAKE BAND RELEASED
FRONT UNIT CLUTCH DISENGAGED
REAR UNIT BRAKE BAND RELEASED
REAR UNIT CLUTCH DISENGAGED
FREE TO SPIN
ALL ROTATING PARTS ARE SHOWN BY DOUBLE SECTIONING.

NEUTRAL

(WITH ENGINE RUNNING)

In neutral with the engine running there is no oil pressure to the front servo or either of the clutches, therefore the front brake band is held in the released position by a release spring in the front servo. Oil pressure is diverted to the rear servo to release the rear brake band. Thus, both brake bands and both clutches are free and no drive can be taken through the transmission.

FIRST GEAR



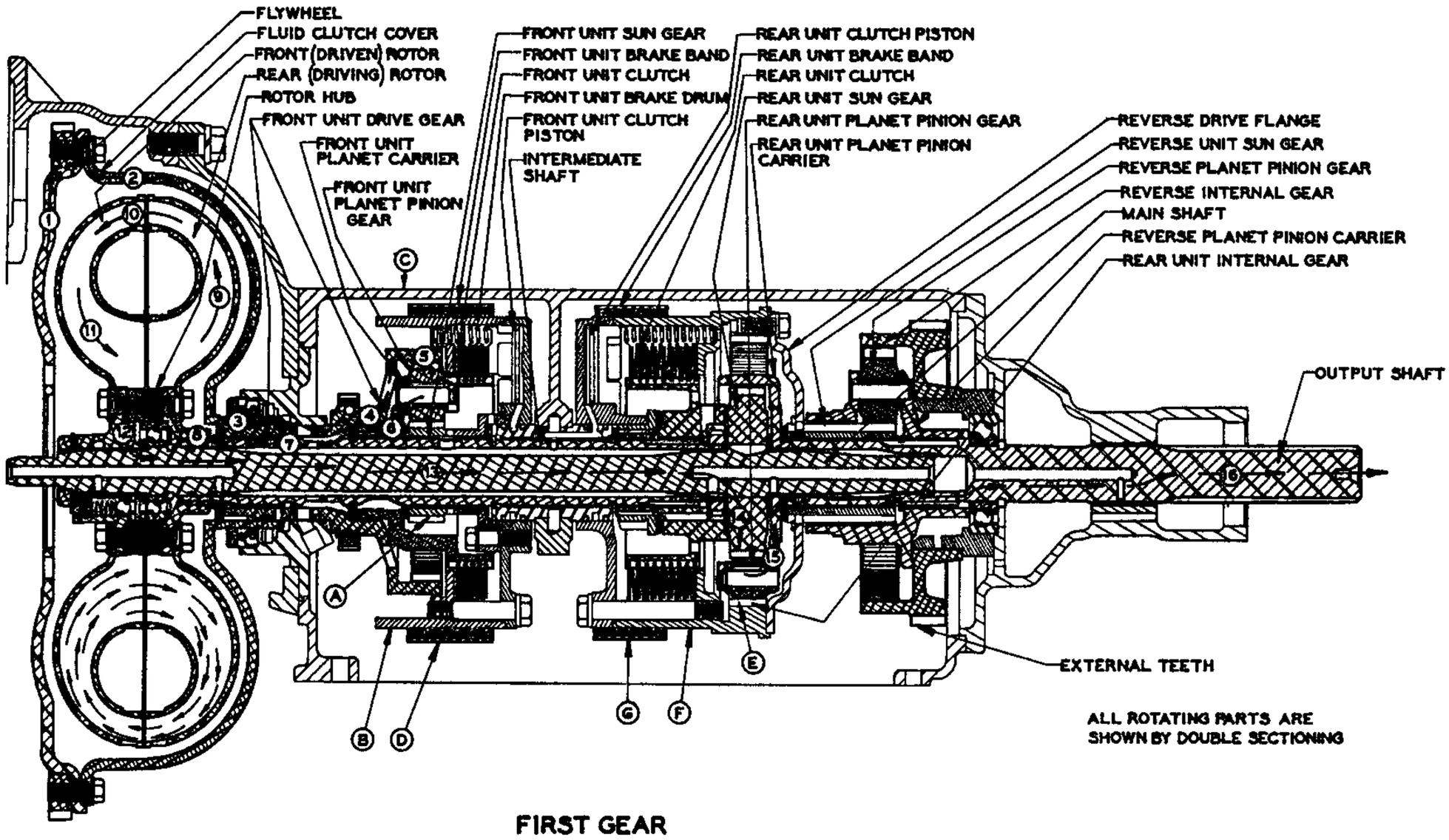
FIRST GEAR
3.658 : 1 REDUCTION

HYDRA-MATIC DRIVE

The power flow and general mechanical operating characteristics of the Oldsmobile HYDRA-MATIC DRIVE may be described briefly as follows:

The Flywheel (1) is bolted to the engine crankshaft. The Fluid Clutch Cover (2) is bolted to the Flywheel, and splined at (3) to the Front unit Drive Gear Quill (4). The power flows on through Internal Gear Teeth (5) through Planet Carrier Assembly (6) which rotates at .7 of engine speed as it is reacted upon by Sun (center) Gear (A) which is held stationary by virtue of being bolted to the hub of Drum (B), which is locked to the Case (C) through Brake Band (D). Planet Carrier Assembly (6) is keyed to Intermediate Shaft (7) which is in turn splined at (8) to the Rear (Driving) Rotor (9).

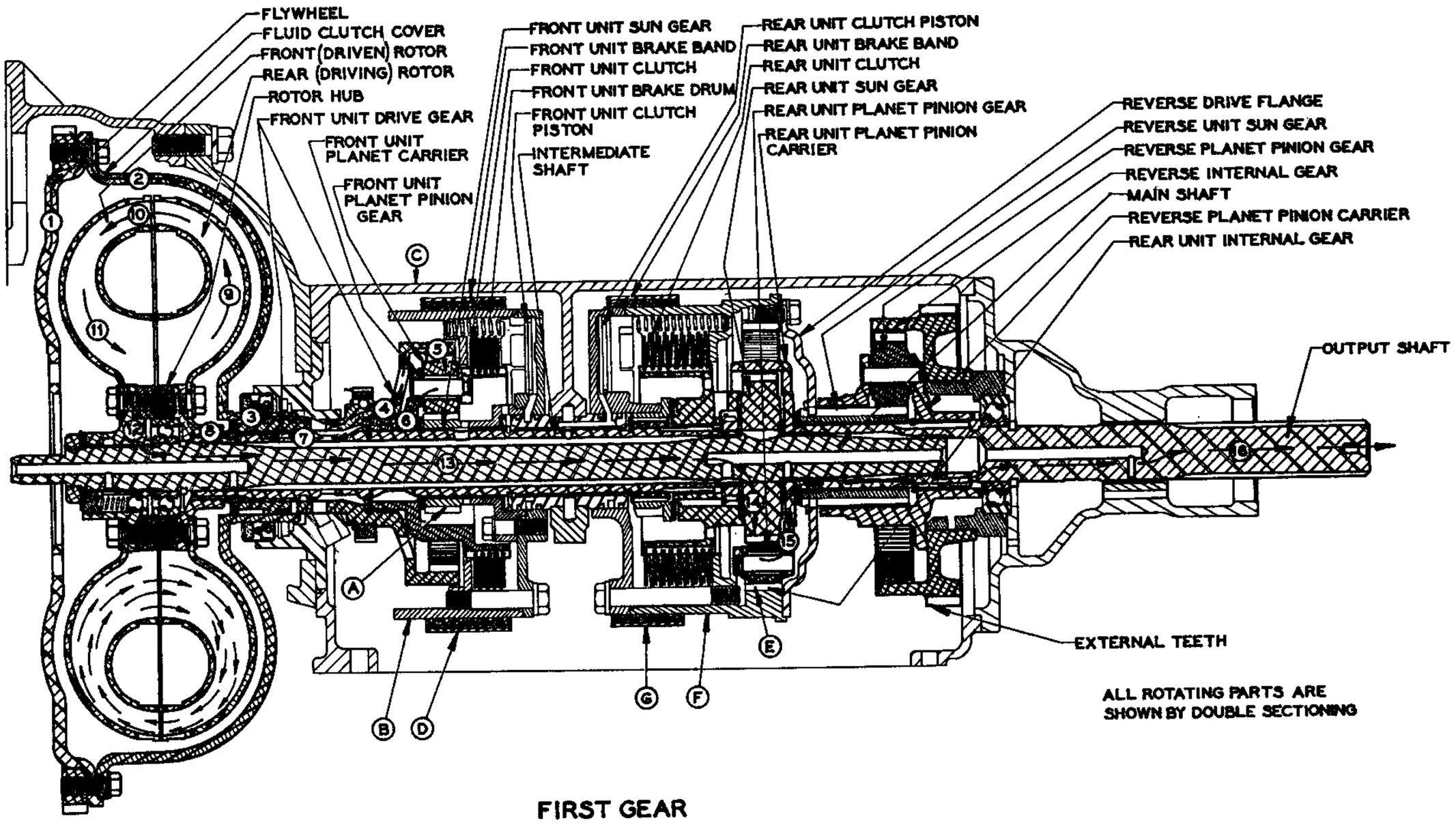
FIRST GEAR



FIRST GEAR
3.658 : 1 REDUCTION

This Rotor revolving, as noted, at .694 (.7) of engine speed imparts centrifugal force to the oil with which it is filled. The oil is in turn thrown from the Rear Rotor across Gap (10) to the Front (Driven) Rotor (11); and as it spends its force, it flows back again to the inner contour of the Rear Rotor. The Front Rotor is splined at (12) to the Main Drive Shaft (13). The power then progresses through Driving Sun (Center) Gear (14) of the Rear Planetary Unit into Planet Carrier Assembly (15), which is reduced in speed to .395 (.4) of the Front Gear, because it is reacted upon by Ring Gear (E) which, as an element of Drum (F), is locked to the Case by Brake Band (G).

FIRST GEAR



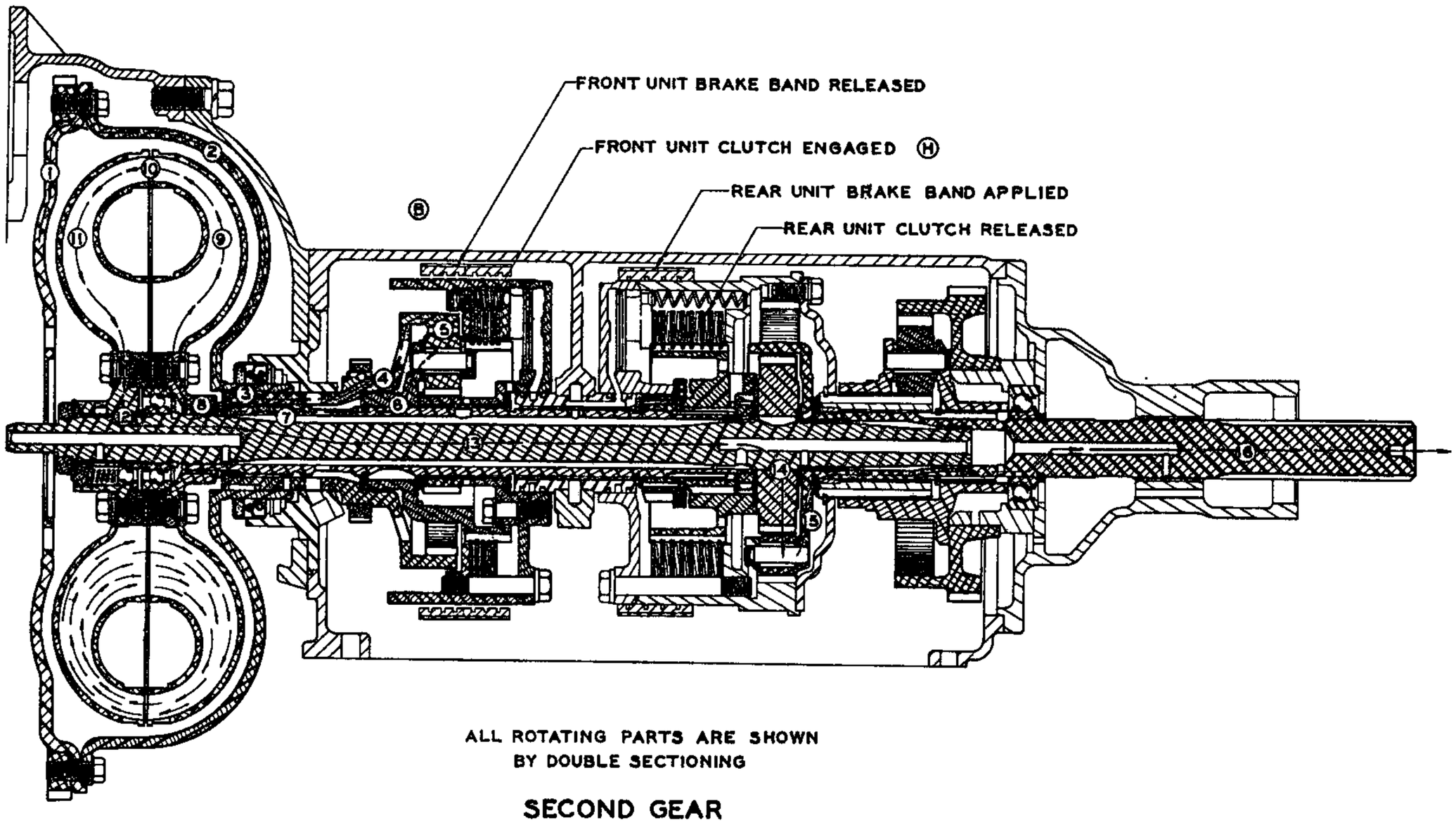
FIRST GEAR

3.658 :1 REDUCTION

The rear Unit Planet Carrier is a part of Output Shaft (16) which rotates at .694 (.7) x .395 (.4) = .274 (.28) of engine speed. Slippage of the driven fluid member reduces this output speed very slightly.

In the above description the Front Brake Band is applied by hydraulic pressure and the Rear Band by both spring and hydraulic pressure. The Fluid coupling is kept filled under pressure by an Oil Pump.

SECOND GEAR

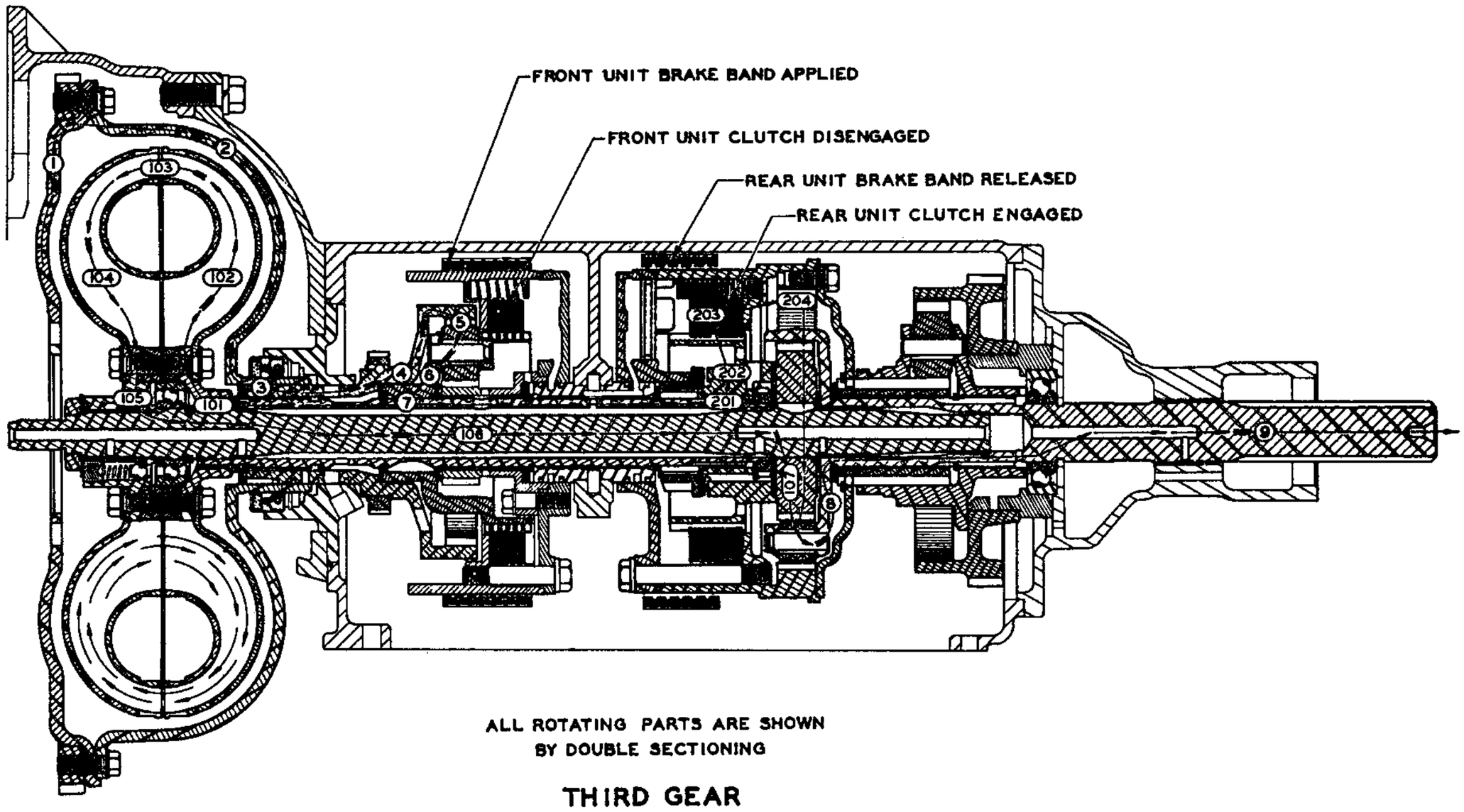


ALL ROTATING PARTS ARE SHOWN
BY DOUBLE SECTIONING

SECOND GEAR
2.533:1 REDUCTION

As in first gear, the power flow progresses to Internal Gear Teeth (5) where it is transferred to the Front Unit Planetary Carrier which, in this case, is locked by Clutch (H) to Intermediate Shaft (7) through Drum (B) and the Sun Gear. The power then proceeds through Splines (8), Rotor Elements (90, (10), (11) and (12) to Main Shaft (13), where it is transmitted through Rear Unit Elements (14) and (15) into Output Shaft (16). Neglecting slippage of the Fluid coupling, the Output Shaft in second speed is obviously reduced to only .395 (.4) of engine speed as the Front Planetary Unit has served merely as a direct coupling. The Front Unit Brake Band in second gear is released and the front unit multiple disc clutch is held by hydraulic pressure.

THIRD GEAR

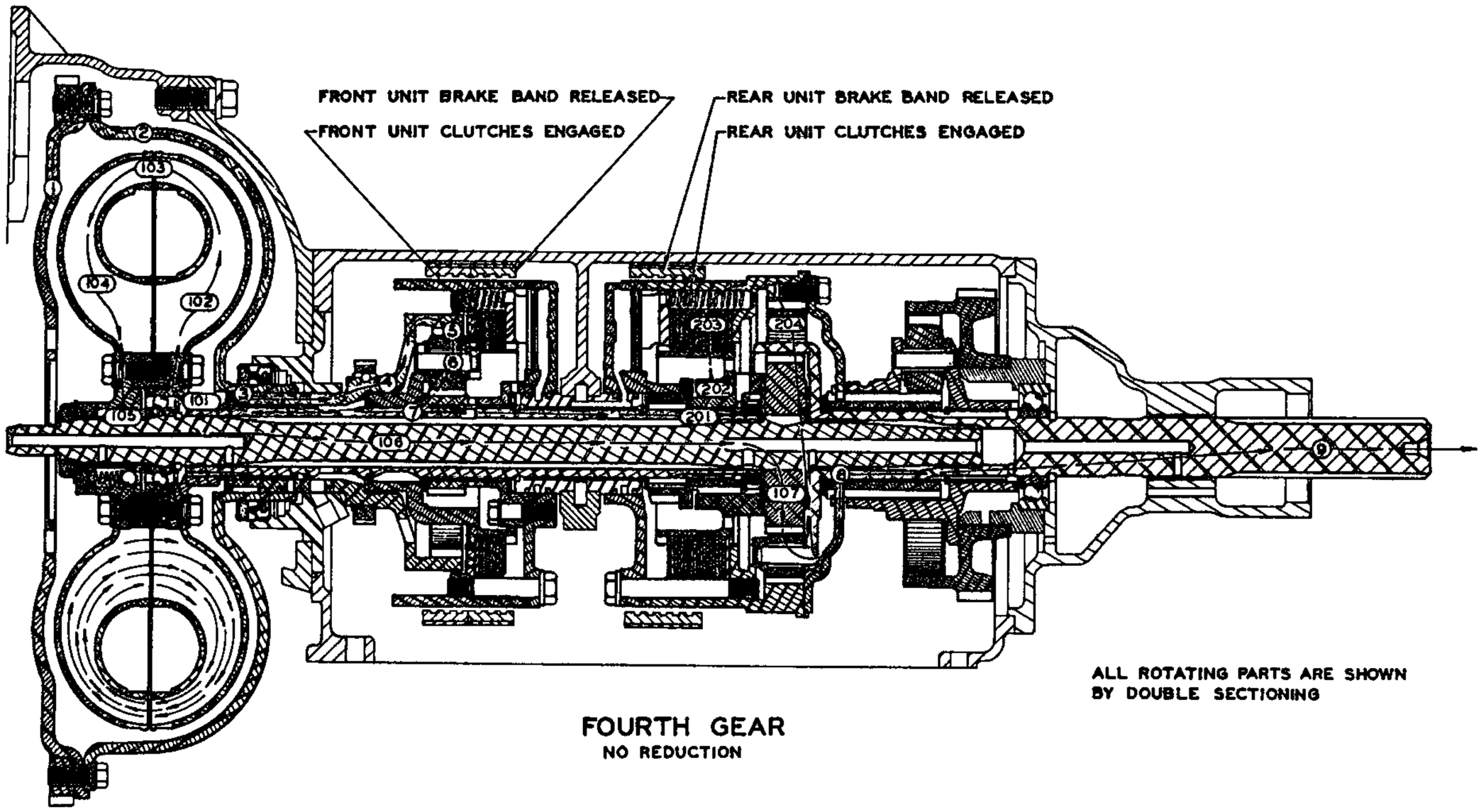


ALL ROTATING PARTS ARE SHOWN
BY DOUBLE SECTIONING

THIRD GEAR
1.444:1 REDUCTION

As in first gear the power flow and reactive elements are the same through Front Unit Planet Carrier Assembly (6). When the power enters Intermediate Shaft (7), the torque is split two ways. Approximately 40% goes through Fluid Clutch elements (101), (120), (103), (104), and (105), and Main Shaft (106) as in First or Second Gears. The remainder (approximately 60%) is carried rearward by the Intermediate Shaft through Splines (201), to Clutch Hub (202), Clutch (203), and Internal Gear Teeth (204), to Rear Unit Planet Carrier (8). At this point, the portion of the torque carried by shaft (106) is imparted through Sun (center) Gear (107) to the Rear Unit Planet Carrier also. Output Shaft (9) is an integral part of the Rear Unit Planet Carrier, and manifestly rotates at .696 (.7) of engine speed (slippage neglected). The Rear Unit Brake Band is released by hydraulic pressure overcoming spring pressure. The Rear Unit Clutch is operated hydraulically.

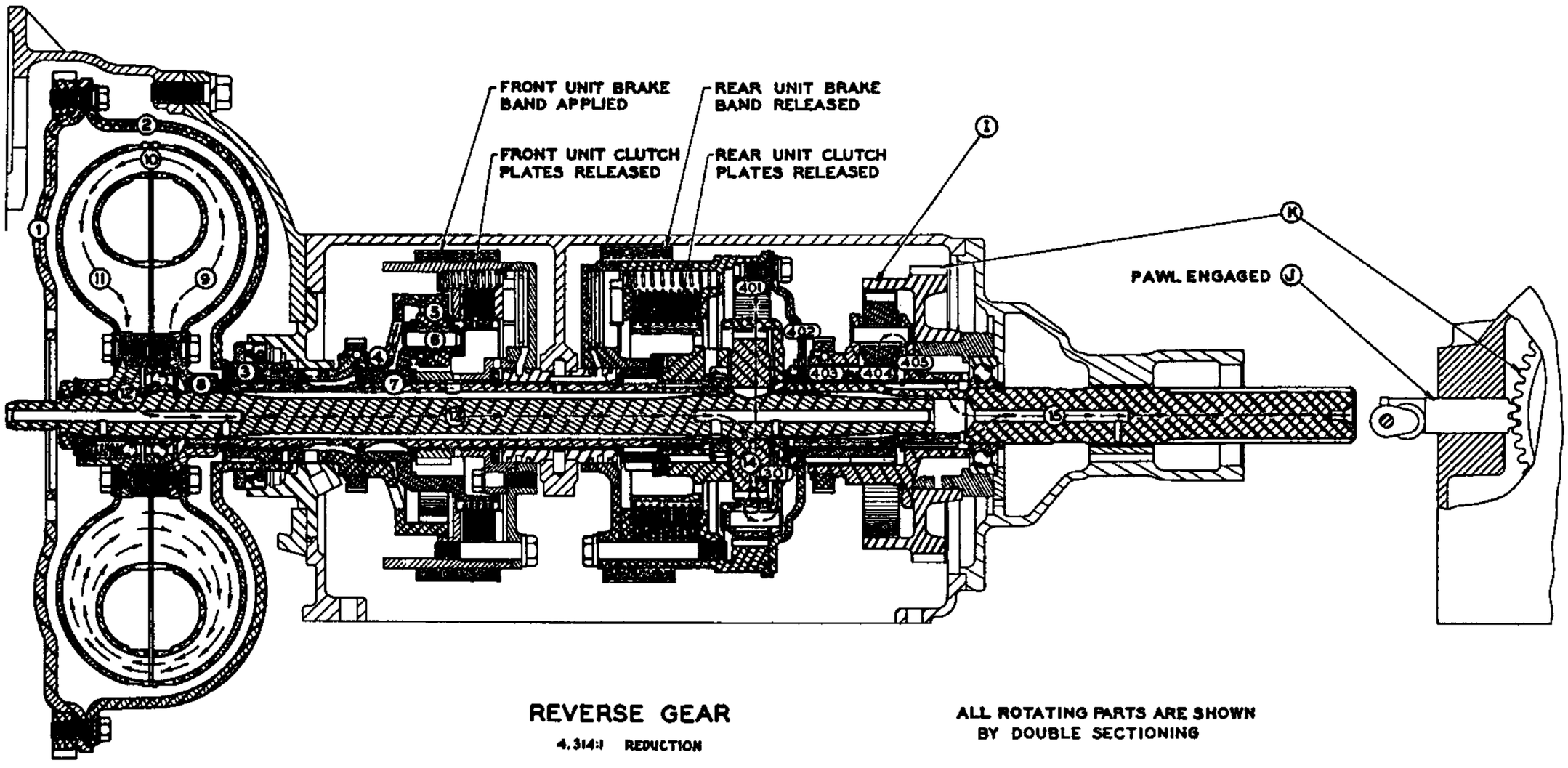
FOURTH GEAR


FRONT UNIT BRAKE BAND RELEASED
FRONT UNIT CLUTCHES ENGAGED
REAR UNIT BRAKE BAND RELEASED
REAR UNIT CLUTCHES ENGAGED
ALL ROTATING PARTS ARE SHOWN BY DOUBLE SECTIONING

FOURTH GEAR
NO REDUCTION

As in second gear the power flows through to (1) to (6) to Intermediate Shaft (7) at which point it splits, as in Third Gear, progressing in part through (101) to (107) and the balance through (201) to (204) and thence through Carrier (8) and Shaft (9). Neglecting fluid slippage, fourth gear is a direct drive.

REVERSE GEAR



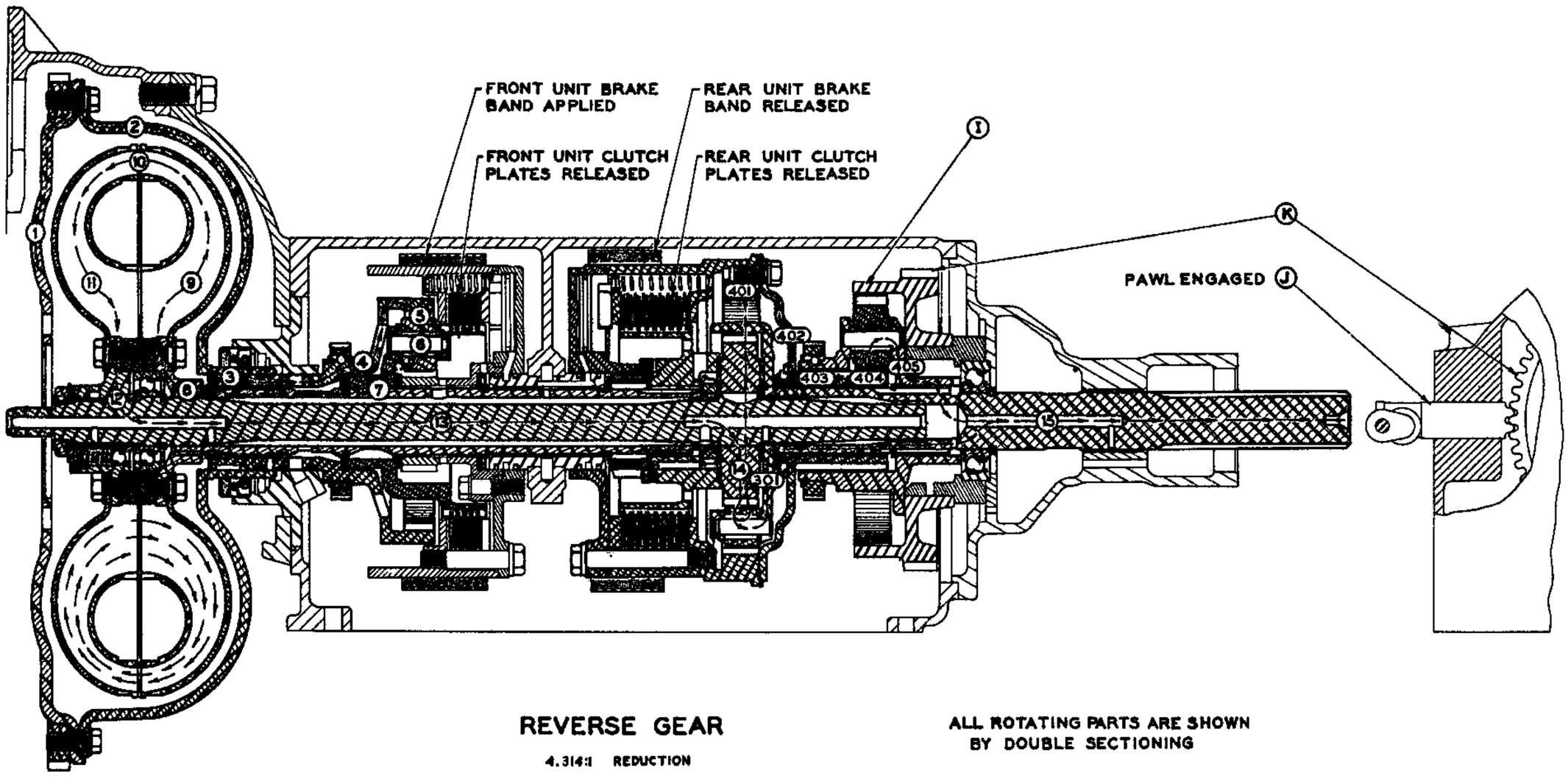
REVERSE GEAR

4.314:1 REDUCTION

ALL ROTATING PARTS ARE SHOWN BY DOUBLE SECTIONING

In reverse the flow of power is the same as in first gear through the Rear Unit Sun Gear (14). As the torque enters the Planet Pinion, however, it divides: part of the rotative force going with the Rear Unit Planet Carrier (301), the rest being transmitted into the Rear Unit Internal Gear (401), whence it progresses through the Drum End (402) and Fingers (403) into Reverse Sun Gear (404) and into Reverse Planet Carrier (405). Here it rejoins the force put into Spider (301) in Output Shaft (15). Now the Reverse Internal Gear (I) furnishes a reaction to the Reverse Planet Assembly as it is held stationary by means of a Pawl (J) engaged with the External Teeth (K).

REVERSE GEAR



REVERSE GEAR

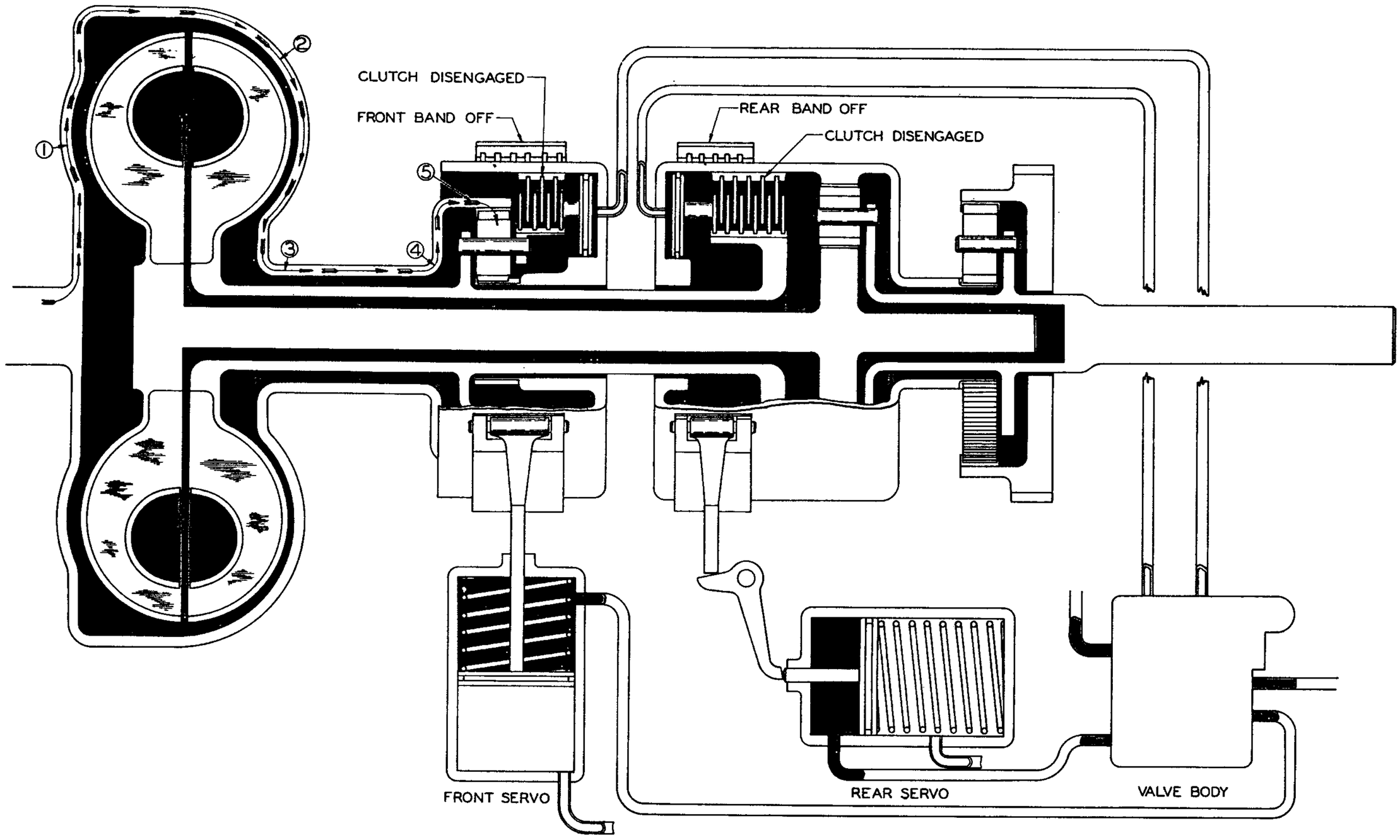
4.314:1 REDUCTION

ALL ROTATING PARTS ARE SHOWN BY DOUBLE SECTIONING

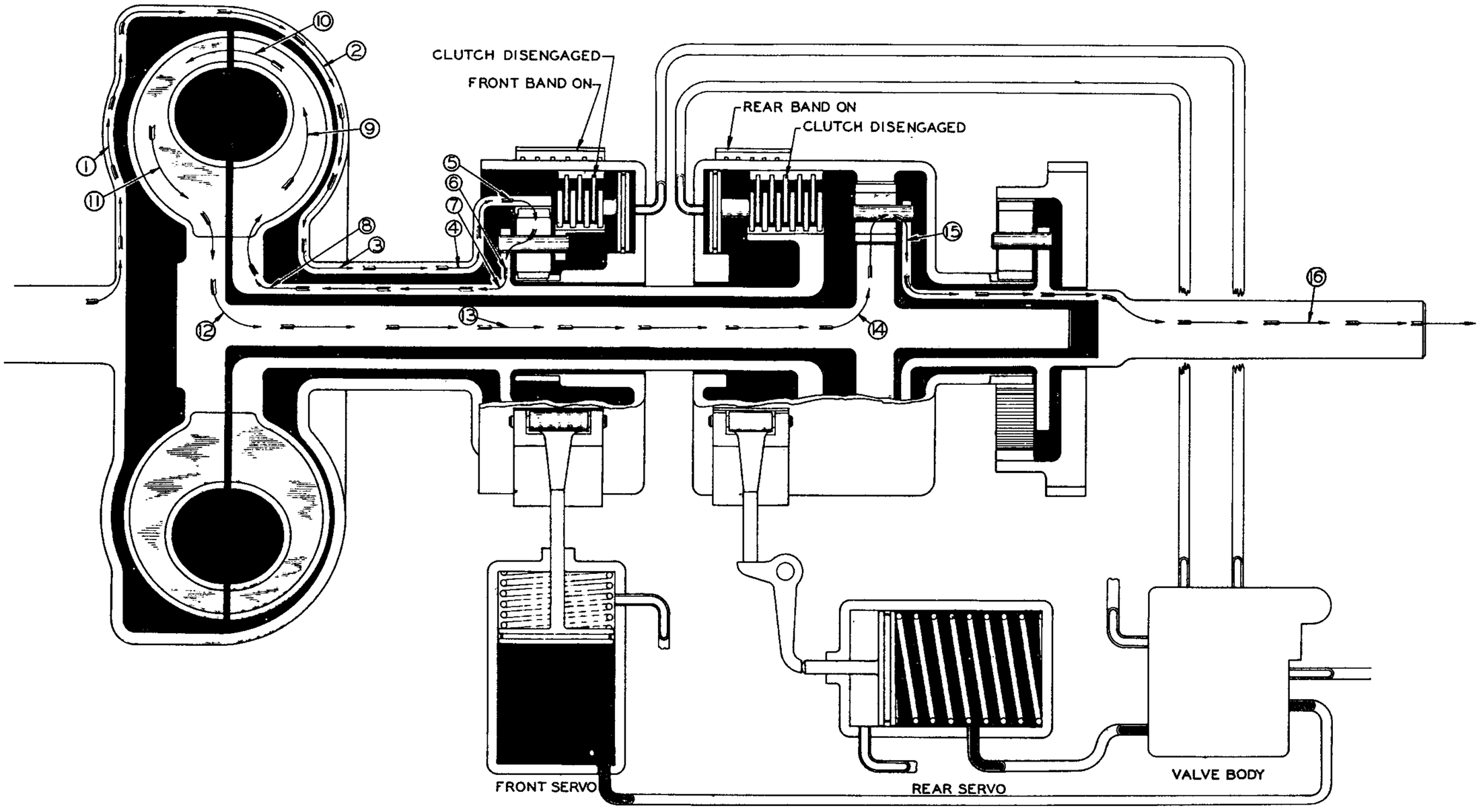
Reversal of motion occurs as follows: The Rear Unit Sun Gear revolves in the same direction as the engine causing its meshing Planetary Pinions to rotate oppositely, in turn causing the Rear Unit Ring Gear to revolve in a direction opposite to the motor since it is not held stationary as in First Gear. Thus, the Reverse Planetary set, is allowed to become an intermediate or floating member instead of a reaction member. As the Rear Unit Ring Gear moves, it carries the Rear Unit Planet Carrier rotatively at a reduced speed. The Rear Unit Brake Band is released hydraulically (the clutches are also disengaged) and the Pawl is engaged through suitable linkage by manual operation.

THE FOLLOWING DRAWINGS SHOW IN A SIMPLE MANNER THE SHIFTS THAT HAVE JUST BEEN EXPLAINED

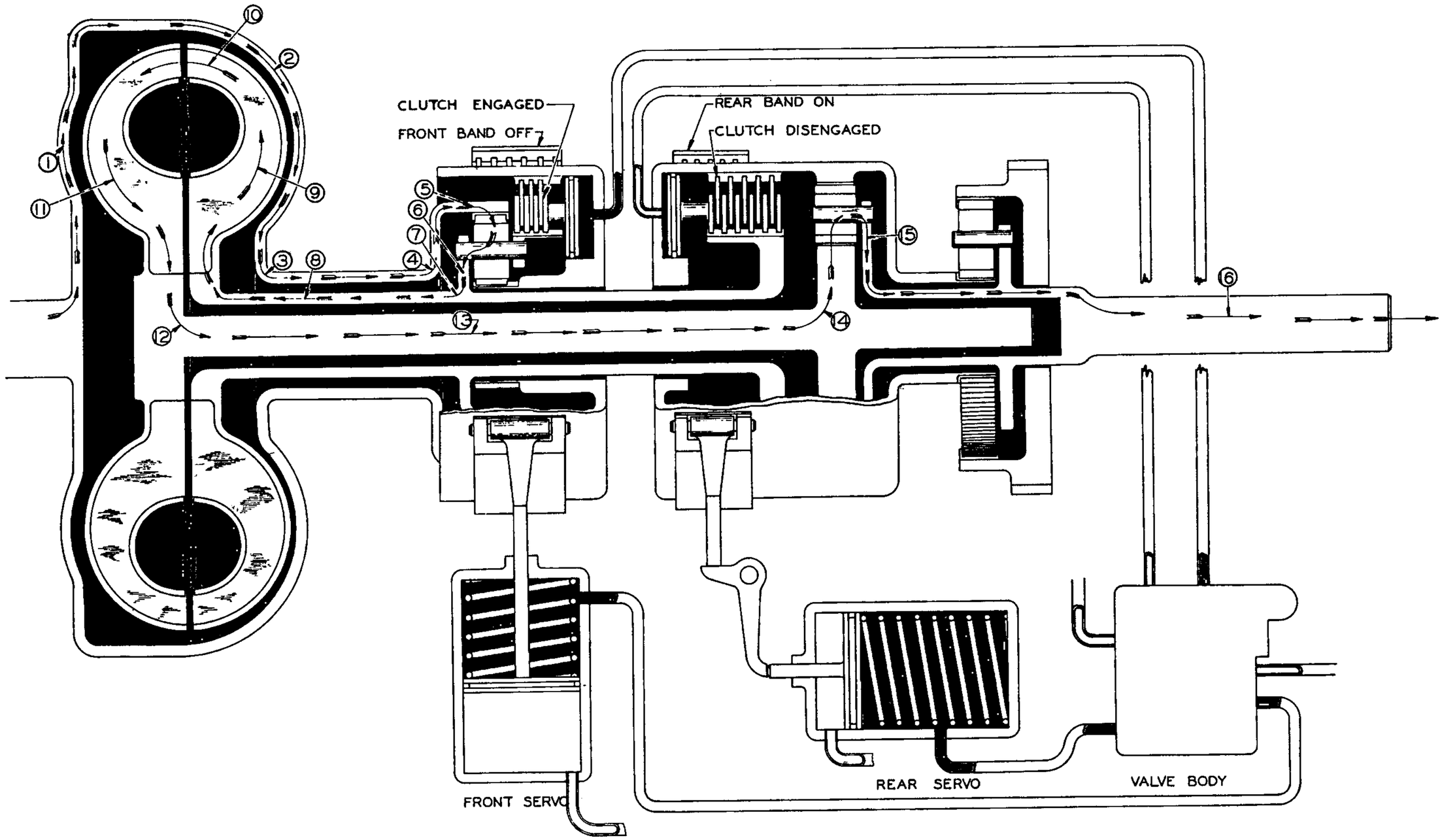
NEUTRAL


CLUTCH DISENGAGED
FRONT BAND OFF
REAR BAND OFF
CLUTCH DISENGAGED
1
2
3
4
5
FRONT SERVO
REAR SERVO
VALVE BODY

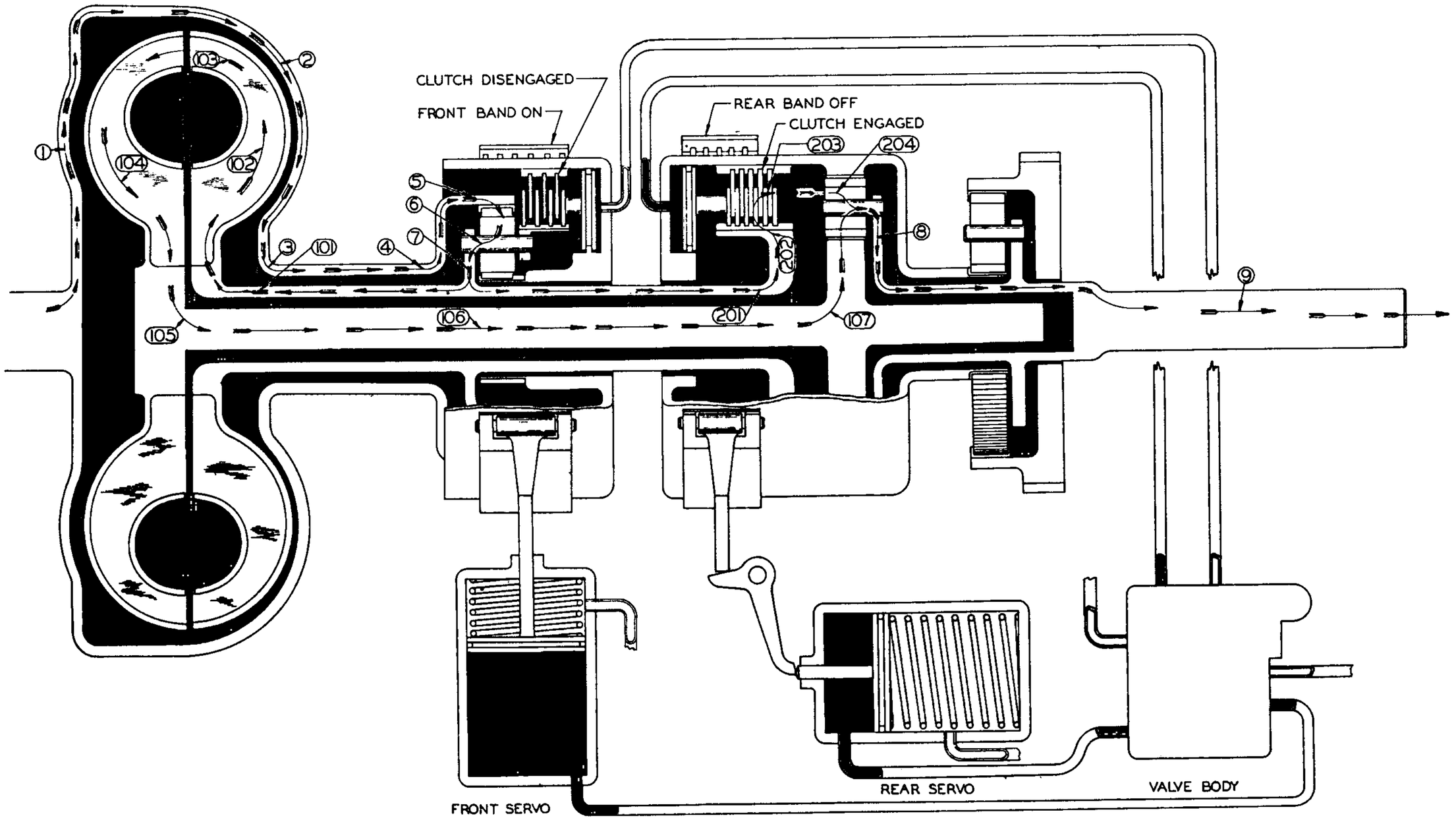
FIRST GEAR


CLUTCH DISENGAGED
FRONT BAND ON
REAR BAND ON
CLUTCH DISENGAGED
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
FRONT SERVO
REAR SERVO
VALVE BODY

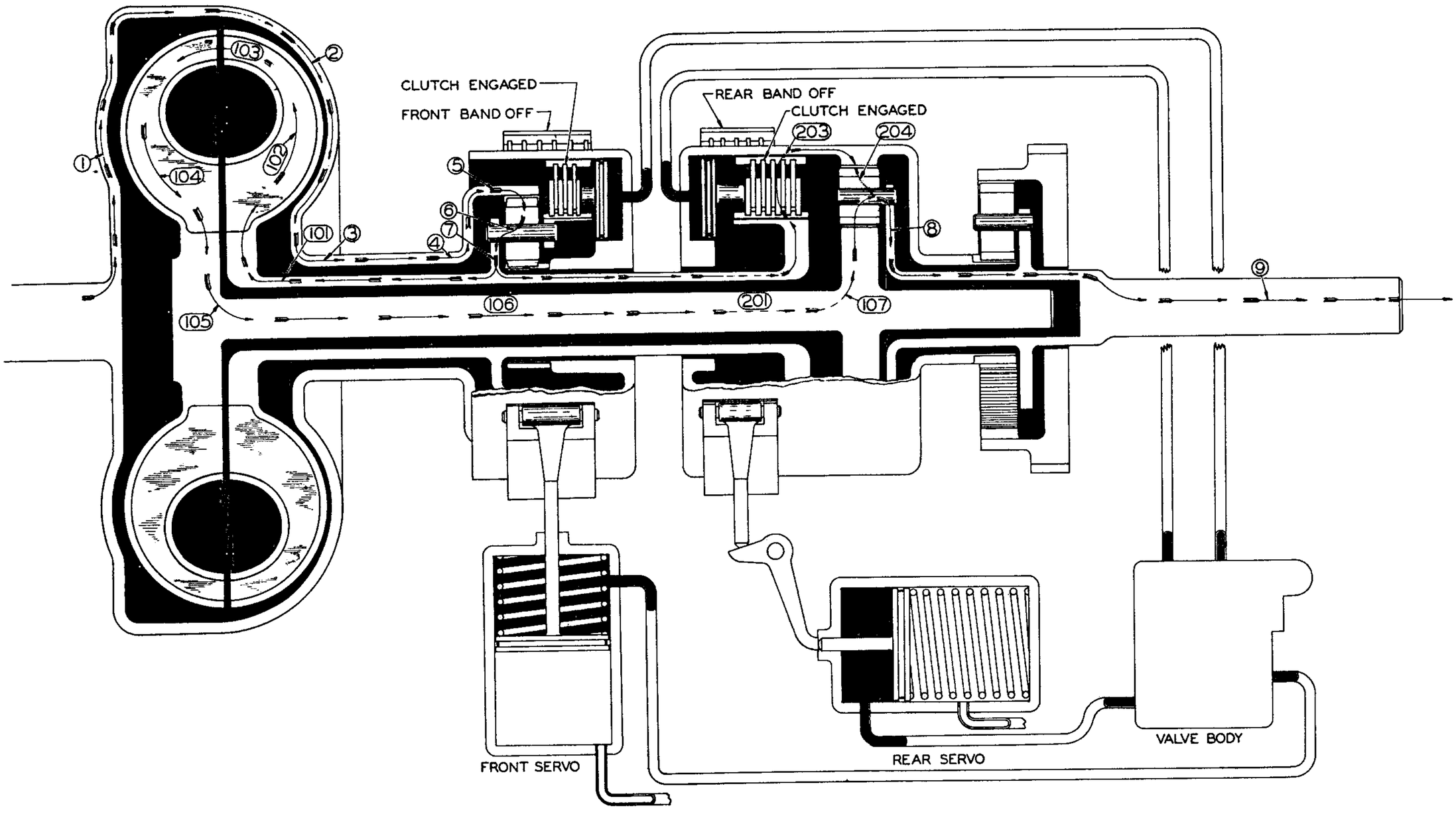
SECOND GEAR


CLUTCH ENGAGED
FRONT BAND OFF
REAR BAND ON
CLUTCH DISENGAGED
FRONT SERVO
REAR SERVO
VALVE BODY

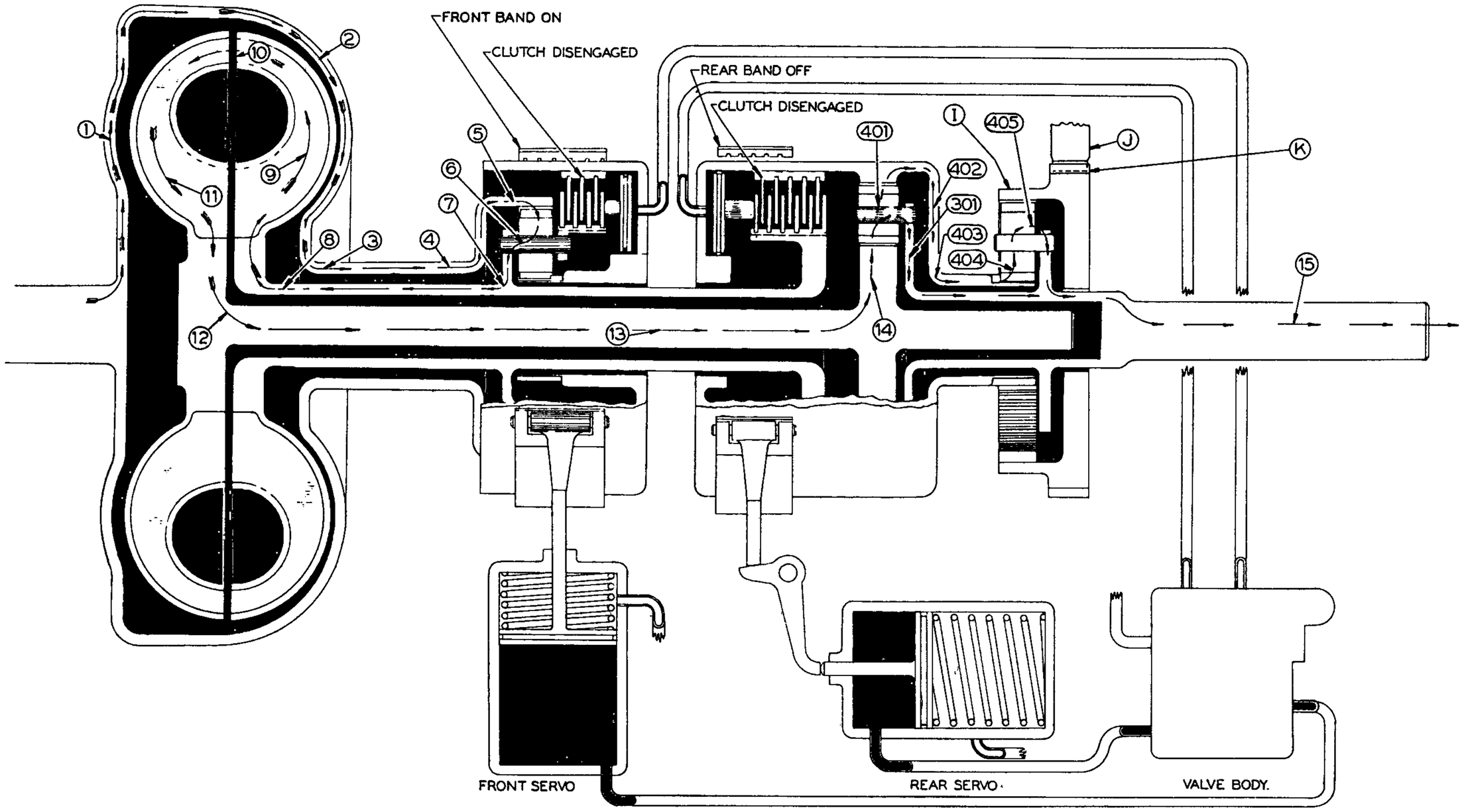
THIRD GEAR


CLUTCH DISENGAGED
FRONT BAND ON
REAR BAND OFF
CLUTCH ENGAGED
1
2
3
4
5
6
7
8
9
101
102
103
104
105
106
107
201
202
203
204
FRONT SERVO
REAR SERVO
VALVE BODY

FOURTH GEAR


CLUTCH ENGAGED
FRONT BAND OFF
REAR BAND OFF
CLUTCH ENGAGED
103
2
1
104
102
101
3
5
6
7
4
203
204
8
9
106
201
107
105
FRONT SERVO
REAR SERVO
VALVE BODY

REVERSE GEAR



PART VI

SERVICING THE HYDRA-MATIC DRIVE

A. Special tools for servicing the Hydra-Matic Drive...

B. Minor Service Adjustments...

C. Major Service Adjustments...

To properly service the HYDRA-MATIC Transmission as instructed on the succeeding pages, it is essential that dealers have the following set of tools, plus hoist complete J-1129.

Part No.	Name	Price Jackson	Price W. Coast
J-1467	Oil Pressure checking gauge unit.	4.95	5.45
J-1466	Snap ring remover pliers.	1.45	1.60
J-1457	C-washer remover (large openings).	.95	1.05
J-1458	C-washer remover (small openings).	.95	1.05
J-1459	Servo band adjusting wrench.	1.25	1.35
J-1460	Servo gauge.	.75	.80
J-1463	Holding fixture. (planetary units).	2.10	2.30
K.M.O. 334	C. H. nut and inter. shaft rear nut wrench.	2.95	3.25
J-1129-40	Ext. safety feet.	1.90	2.10
J-1464	Speedometer Drive gear spacer gauge.	.30	.35
J-1465	Dial ind. ext. rod.	.75	.80
J-1468	Carb. to bell crank rod gauge.	.95	1.05
J-1469	Intermediate lever gauge.	.35	.40
J-1470	Bell crank to cross shaft gauge.	1.50	1.65

B

MINOR SERVICE ADJUSTING

1. Transmission Lubrication.

   a. Capacity of HYDRA-MATIC Drive System.

   b. Filling and draining HYDRA-MATIC Drive System.

2. Carburetion.

3. Adjusting throttle lever.

4. Adjusting manual control lever.

5. Adjusting front Servo Bands.

6. Adjusting rear Servo Bands.

7. Remove and replace HYDRO-MATIC Drive.

8. Replacing light bulb in shift control.

C

MAJOR SERVICING

Major servicing includes correcting any defect within the transmission case except adjustments of Servo Bands.

1

TRANSMISSION LUBRICATION

LUBRICATION USED IN THE HYDRA-MATIC TRANSMISSION

Nothing but Oldsmobile HYDRA-MATIC Drive Fluid may be used in the Oldsmobile HYDRA-MATIC Drive.

Because of the extended policy covering the warranty on this unit, it is important for dealers to advise owners of the strict recommendations being made for the following reasons:

1st. Many oils form varnish and stick up valves in the transmission.

2nd. Because of the warranty based on the fact that only Oldsmobile HYDRA-MATIC Drive Fluid was used in the transmission

Changing HYDRA-MATIC Fluid And Flushing Unit

The transmission and flywheel can be drained by removing plugs in oil pan and fly wheel cover. Oil in both transmission and fly wheel should be drained after each 5000 miles and the unit filled with new HYDRA-MATIC Drive Fluid. Flushing is not necessary, but if done only HYDRA-MATIC Drive Fluid should be used. This is an all-season fluid, good for year around operation. It is available in only the one viscosity.

A

CAPACITY OF HYDRA-MATIC DRIVE SYSTEM

9 quarts of fluid when transmission is drained through drain plugs "A" and "B".

9½ quarts of fluid when pan is removed and cleaned and also drained from flywheel cover.

10 quarts of oil when transmission is removed disassembled and reassembled.

B

FILLING AND DRAINING HYDRA-MATIC DRIVE SYSTEM

1. Raise right edge of front compartment mat.
   CAUTION: Be sure no gravel, sand, or lint from floor mat drops into transmission.

2. Remove sheet metal cover.

3. Run engine for a few moments; then stop.

4. Remove level stick. After letting the transmission set for about a minute fluid level should check "full". Additional fluid can be added to transmission through opening in case from which level stick was removed. When oil pan is removed for adjusting or cleaning, be sure to clean oil screen.

2

CARBURETION

Before starting the description of the control adjustment procedure on the HYDRA-MATIC Drive cars, it is very important that the dealers and their mechanics know that the proper operation of the transmission is absolutely dependent upon the accurate tune up of the engine and external adjustments. Improper engine tune up and particularly the misadjustment of the carburetor idle will result in unsatisfactory transmission performance, therefore before starting to adjust the throttle control, engine idle must be adjusted to 375 R.P.M. using a tachometer with engine and transmission warm and transmission in neutral.

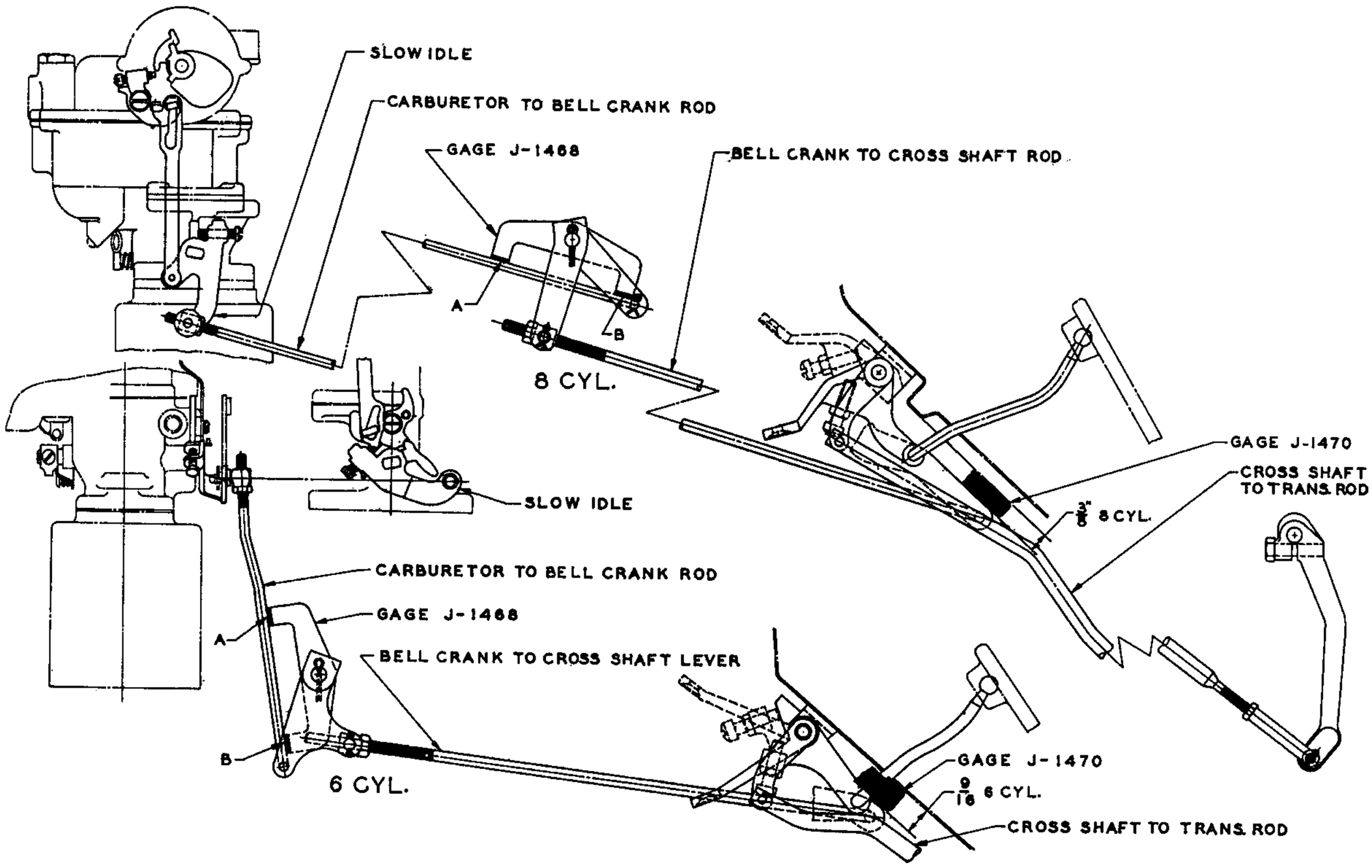
B

FAST IDLE SETTING

It is very important to make this adjustment after the engine is set to 375 R.P.M. Idle and choke valve in closed position, adjust fast idle screw to get .025" opening between end of throttle lever adjusting screw and carburetor casting. Six Cylinder has not been changed.

3

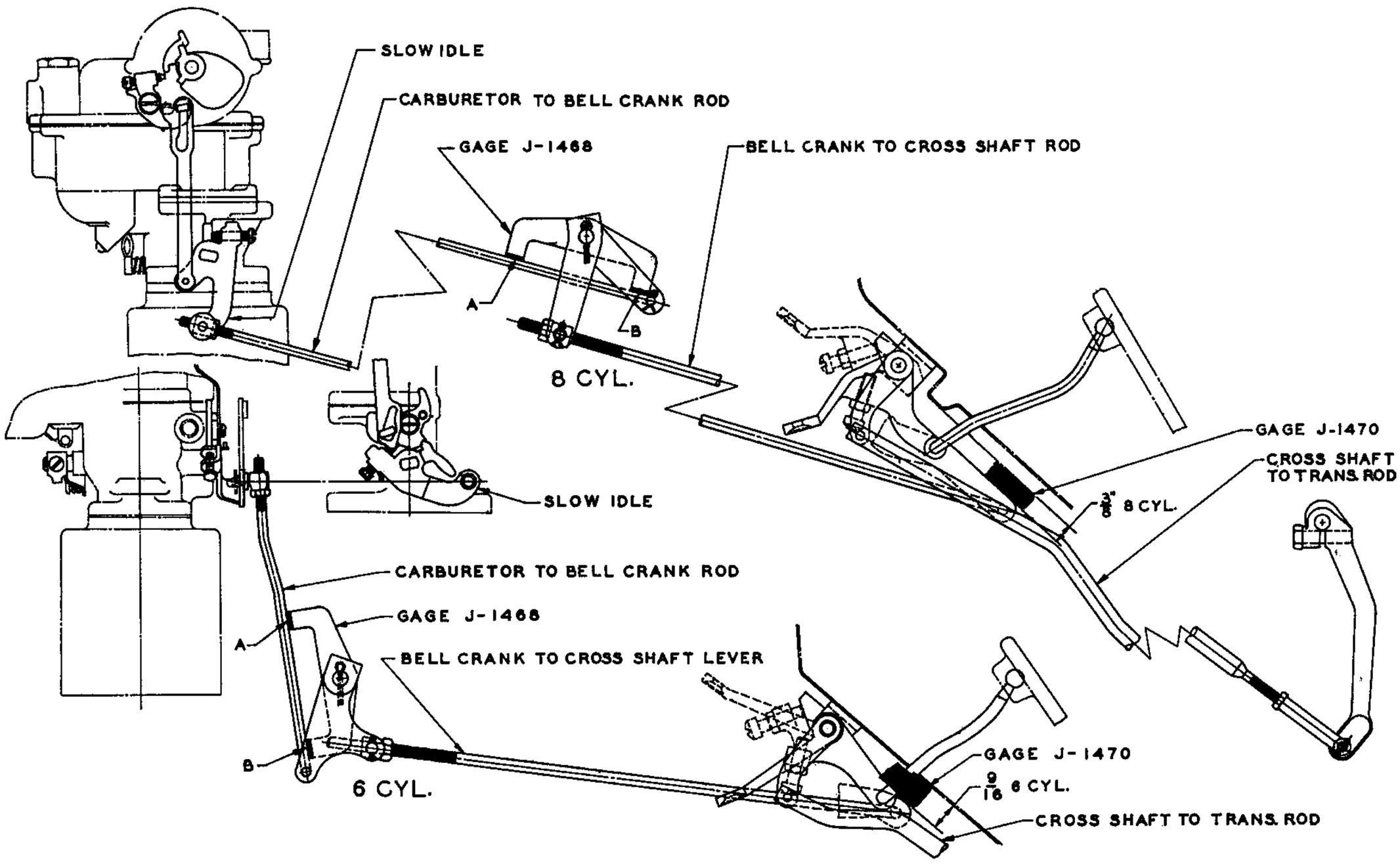
ADJUSTING THROTTLE CONTROL LEVER



1. Disconnect all throttle rods at adjustable ends, namely -
   Carburetor to bell crank rod.
   Bell crank to cross shaft rod.
   Cross shaft to transmission rod.

2. Carburetor must be held in slow idle position while adjusting rods. This can be done with a heavy rubber band permitting both hands to be free to work with.

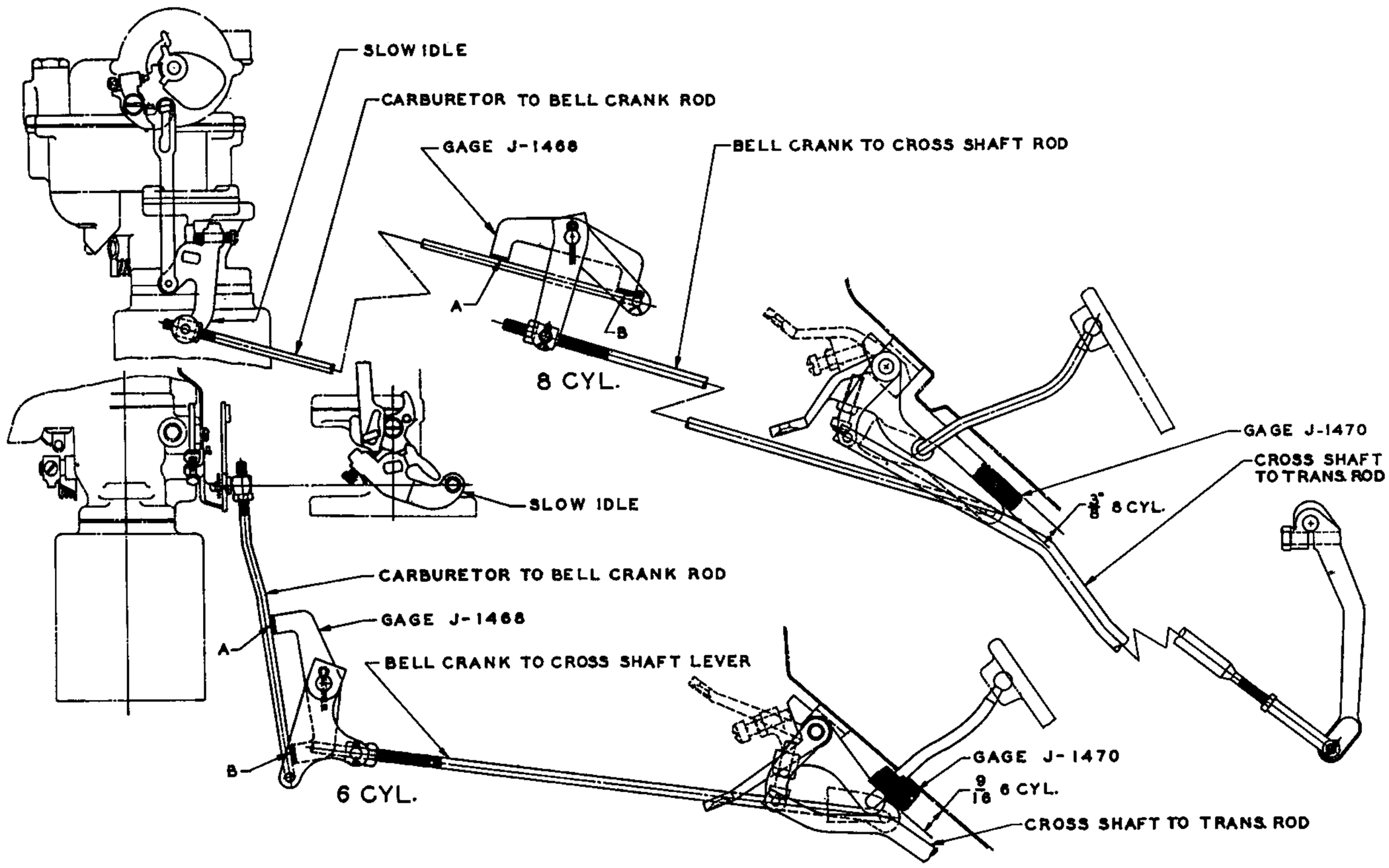
ADJUSTING THROTTLE CONTROL LEVER



3. Using gauge J-1468 as shown, trunnion on carburetor rod must be adjusted and when held fully in position in carburetor, lever must just touch carburetor to bell crank rod at points "A" and "B". Remove gauge. Tighten trunnion check nut, assemble spring over rod and replace cotter key.

4. Place gauge J-1470 on lever at the right side of throttle cross shaft.
CAUTION: Gauge is marked "6" and "8". When adjustment is made on either of these models be sure to use the proper section of the gauge. Clearance between the toe pan and lever is 3/8" on the 90 model and 9/16" on the 60 and 70 model.

ADJUSTING THROTTLE LEVER

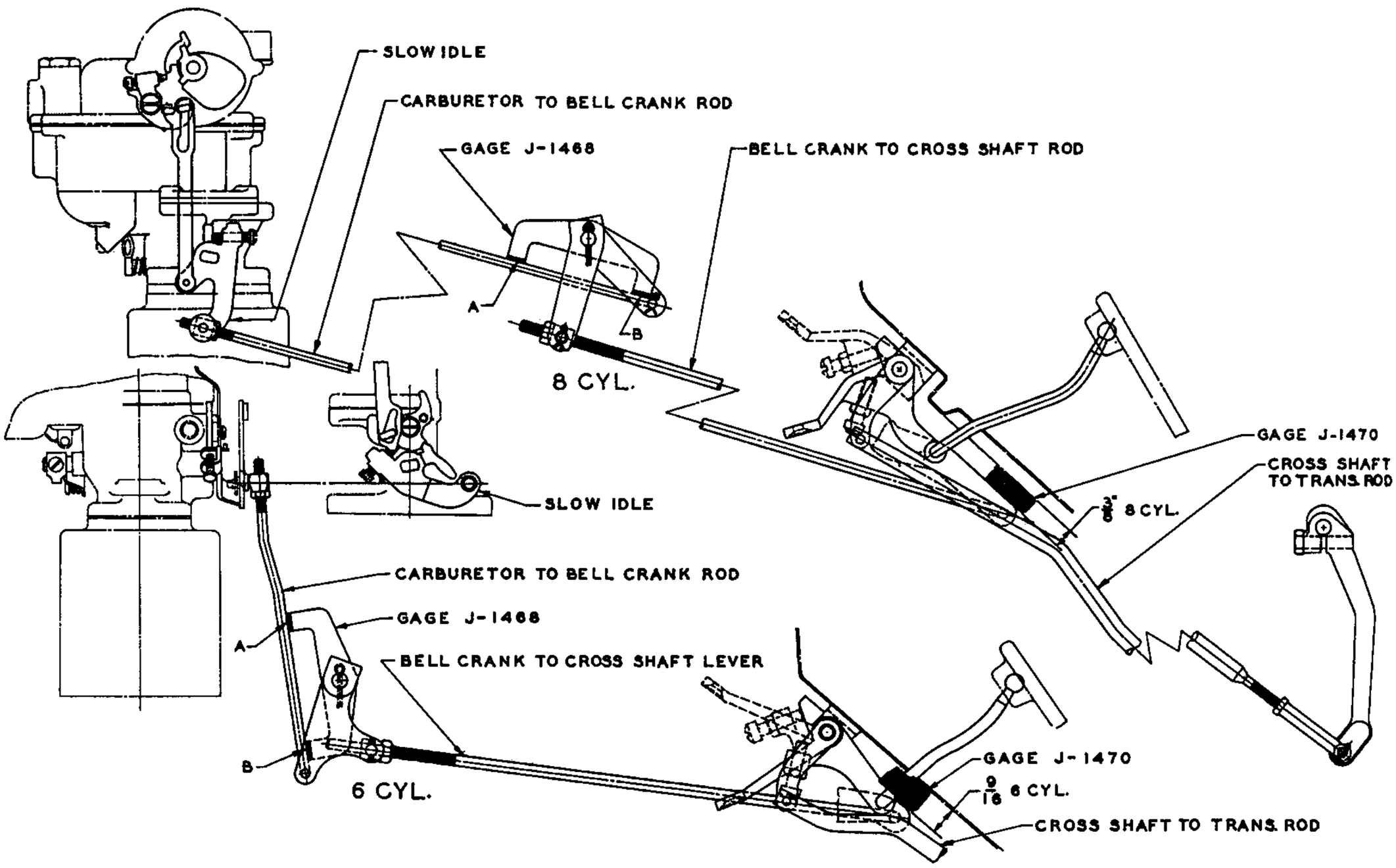


Hold bell crank to cross shaft lever all the way back to be sure the gauge is touching the toe pan. Hold the carburetor in the slow idle position, and adjust trunnion on bell crank to cross shaft rod so it enters freely. Tighten check nut and install cotter key. Remove gauge.

5. Rotate throttle cracker lever on left-hand end of cross shaft upwards to obtain wide open throttle and full over travel of throttle cross shaft.

   Now adjust wide open stop screw so it just contacts the stop on the cross shaft bracket. Tighten locknut.

ADJUSTING THROTTLE LEVER



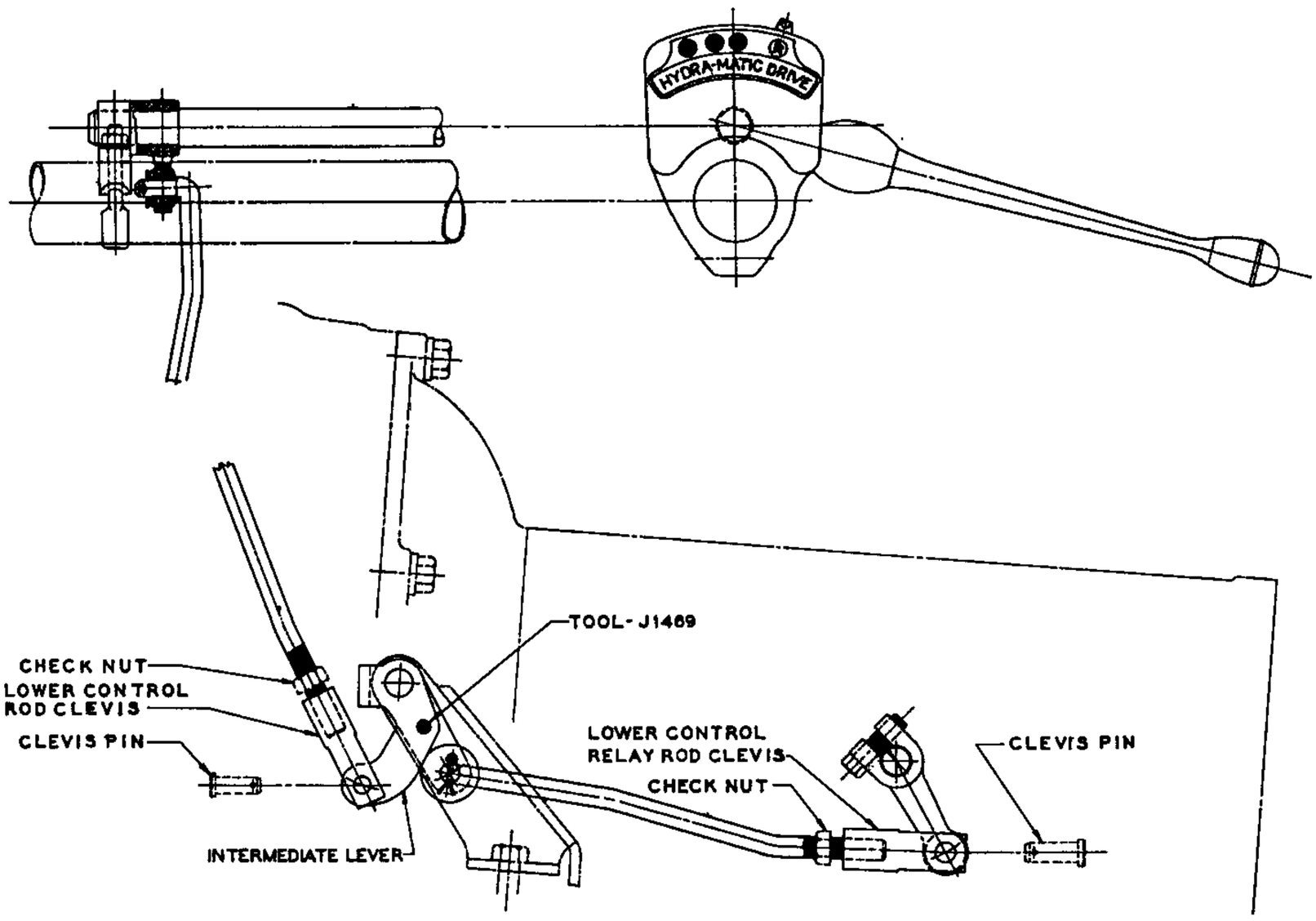
6. Allow cross shaft to return to slow idle position. Be sure carburetor is again held in the slow idle position.

7. Hold throttle lever on side of the transmission against idle stop (all the way back) in transmission; adjust cross shaft to transmission rod so that the clevis pin slips freely through clevis and lever; then shorten rod by 1 full turn of clevis from this position. Reinstall clevis pin, tighten clevis check nut and install cotter pin.

8. Run engine and check for free throttle control and positive return to slow idle.

4

ADJUSTING MANUAL CONTROL LEVER



1. Remove clevis pins from lower control relay rod and lower control rod.

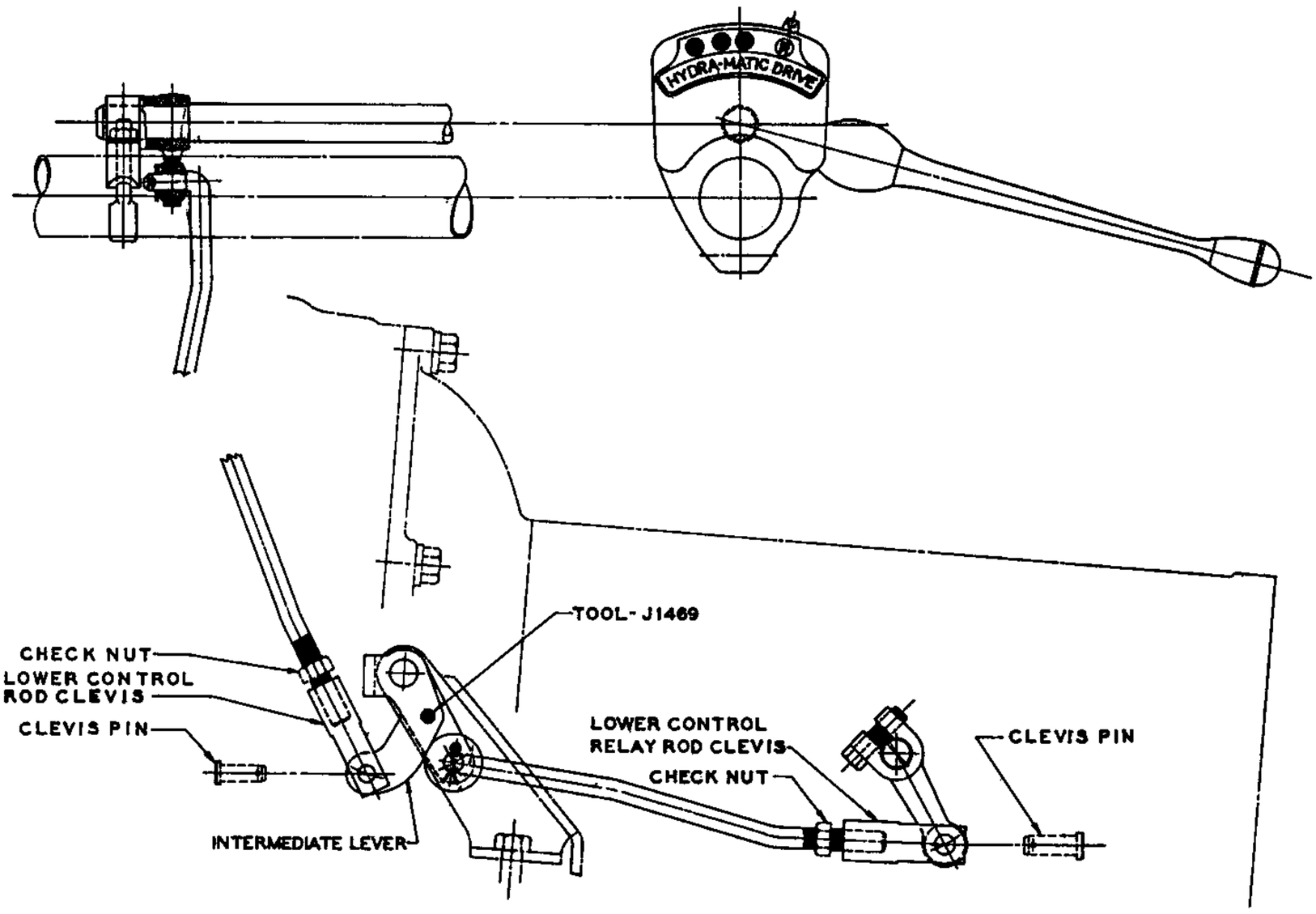
2. Move shift lever at wheel to reverse position.

   CAUTION: Be sure poppet drops into detent.

3. Move intermediate lever so hole will index with hole in bracket; hold the lever in this position by inserting tool J-1469 through holes.

4. Move outer shift lever (manual) on side of transmission as far back as it will go; to insure lever is in the extreme reverse position, rotate propeller shaft by hand until engagement of pawl is felt and lever

ADJUSTING MANUAL CONTROL LEVER



is against stop. Adjust length of lower control relay rod so clevis pin slips freely through the clevis and lever. Assemble wave washer in place, install cotter key and tighten check nut.

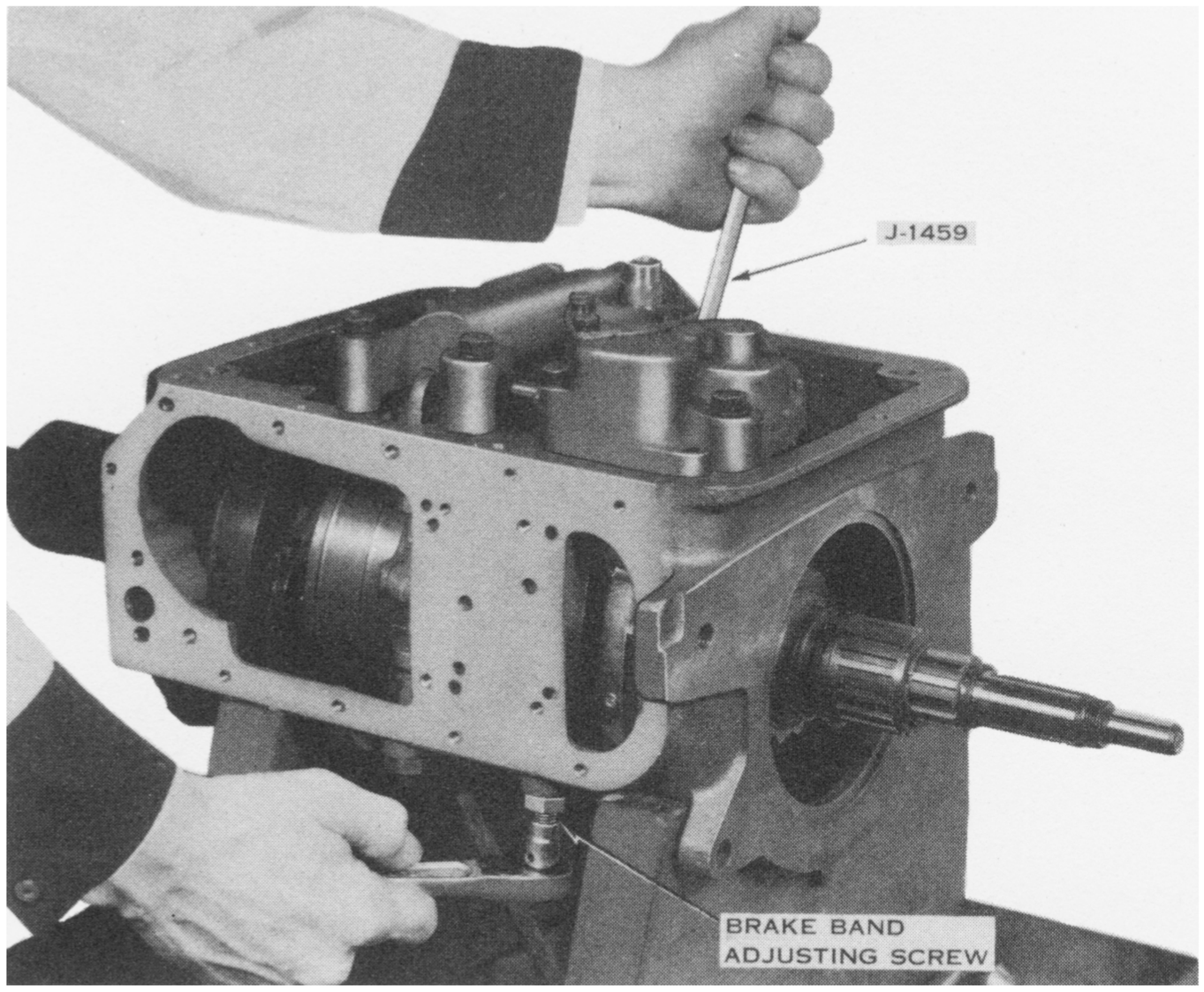
5. Remove tool J-1469 from intermediate lever.

6. Applying slight hand pressure at intermediate lever to hold transmission outer shift lever (manual) against the reverse stop, adjust length of lower control rod so clevis pin slips freely through clevis and intermediate lever.

7. Assemble wave washer, tighten check nut, install cotter key.

8. Check control lever in all positions for free operation.

5
ADJUSTING FRONT SERVO BAND—



1. Loosen lock nut.

2. Place tool J-1459 over cap screw in front unit.

3. Tighten adjusting screw just to the point where drum cannot be moved in either direction.

4. Mark servo band adjusting screw for identification position.

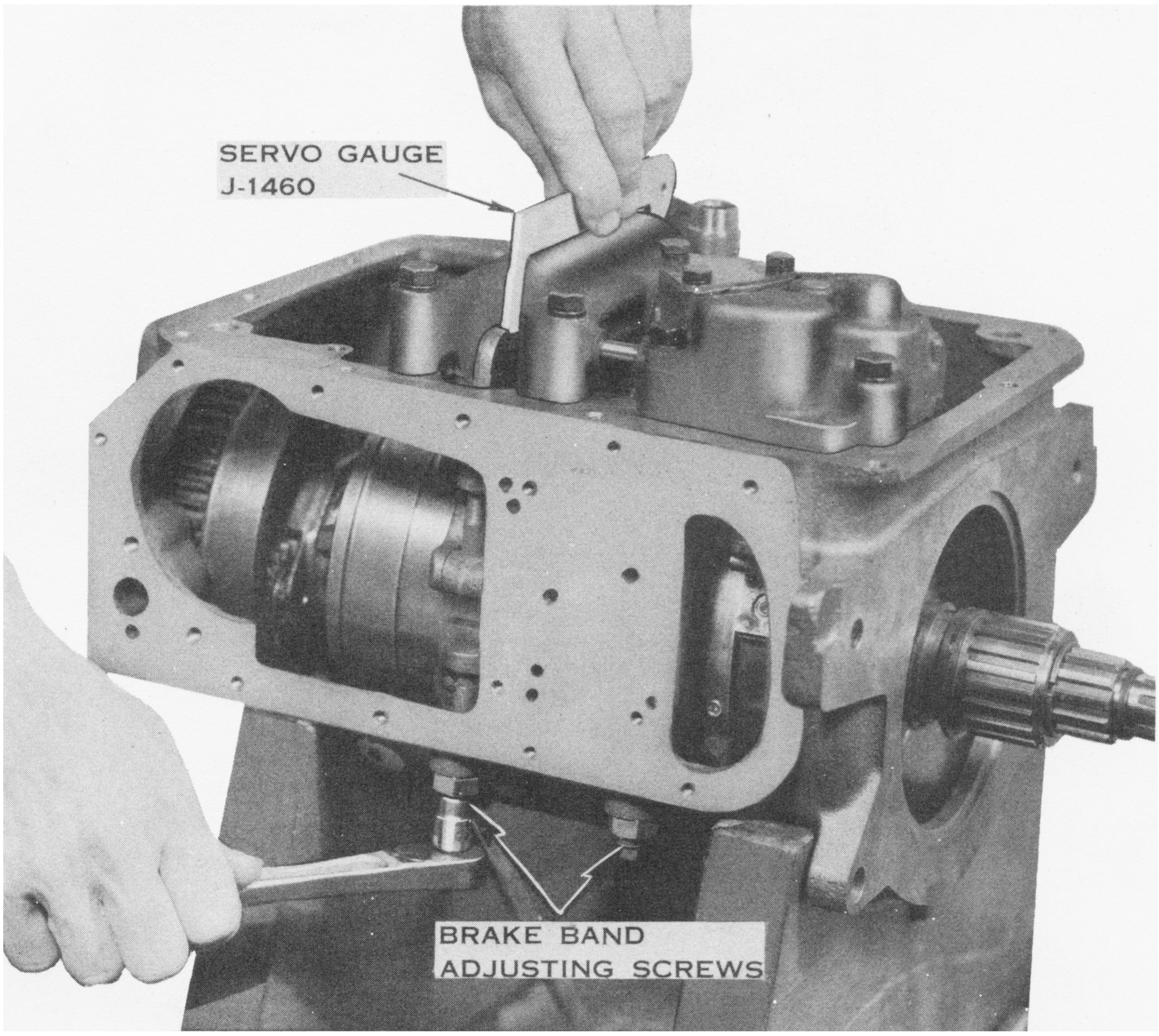
5. Back off adjusting screw 8 turns.

6. Tighten adjusting screw lock nut, being sure adjusting screw does not turn.

   Note: It is important that adjusting screw is not backed off more or less than 8 turns, and that only tool J-1459 be used when making this adjustment.

6

ADJUSTING REAR SERVO BAND—



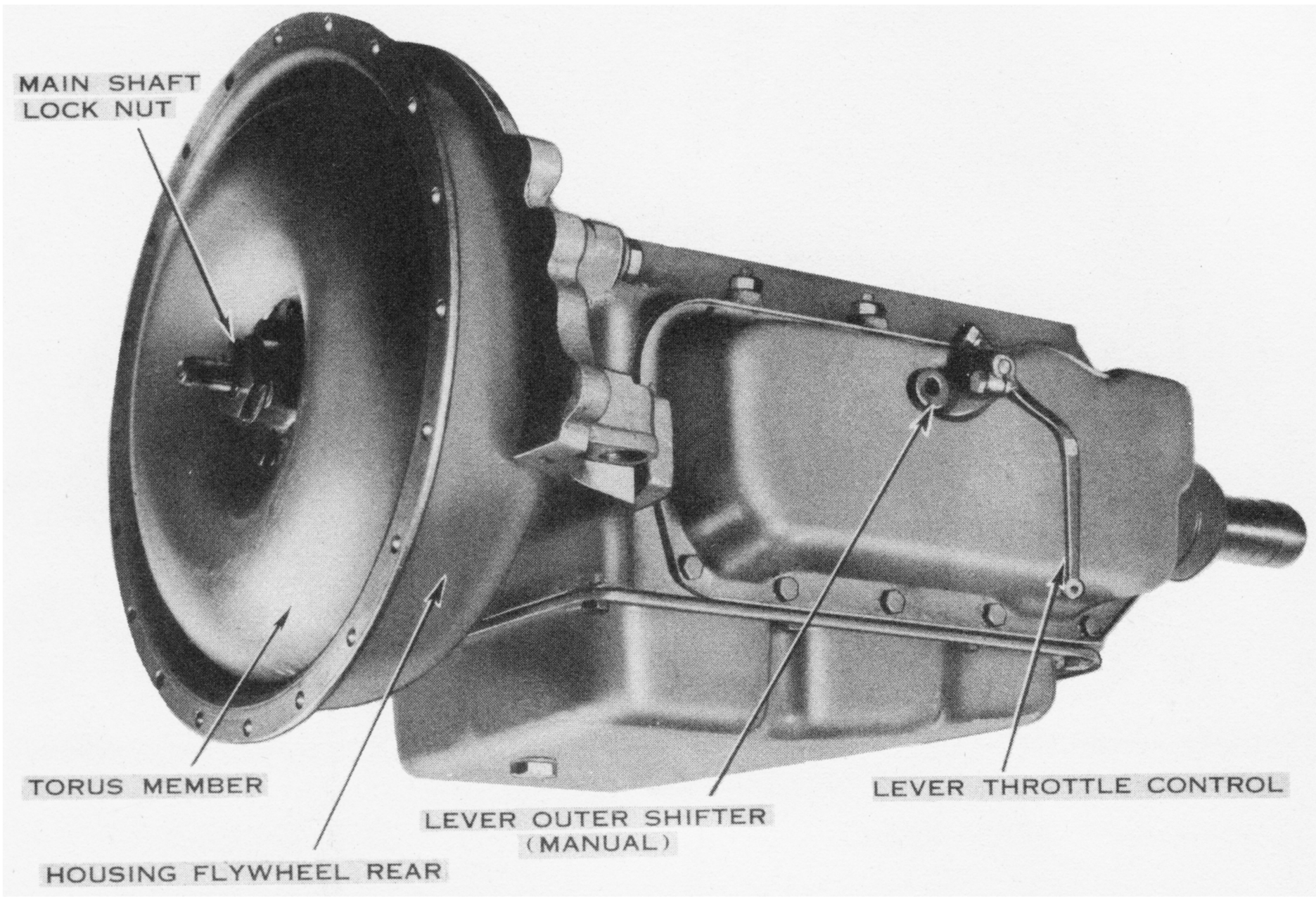
1. Place the brake band gauge J-1460 at bottom of servo.

2. Loosen servo band adjusting screw lock nut.

3. Adjust screw until the end of servo plunger is flush with outer edge of gauge within plus or minus 1/32." Release bar should be used while tightening adjusting screw on rear servo only.

7

REMOVE AND REPLACE HYDRO-MATIC DRIVE



Remove HYDRA-MATIC Transmission Assembly as follows:

1. Raise the car sufficiently to set on jacks so the four wheels will clear the floor approximately 8".

   The removal of the front seat assembly is not necessary.

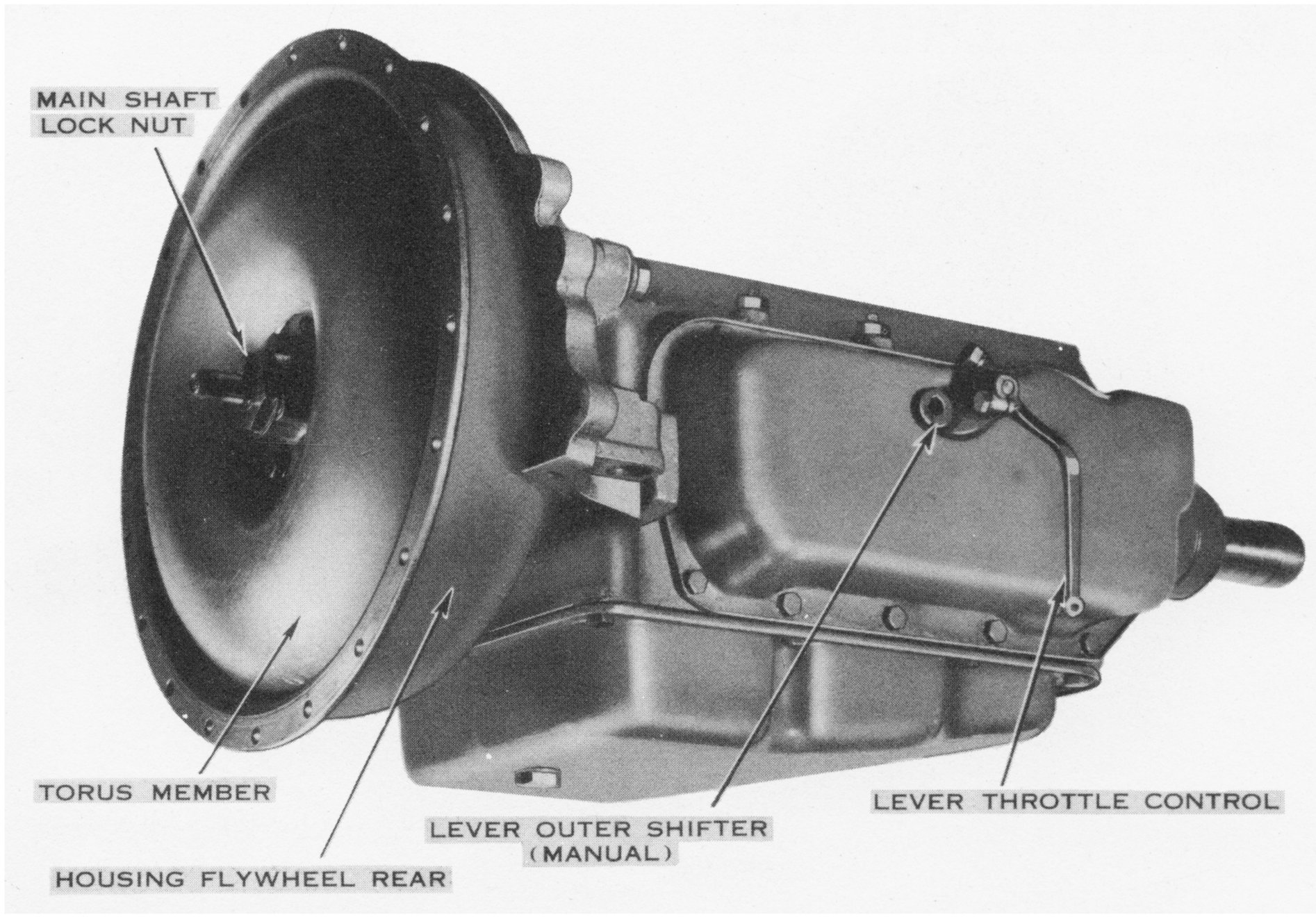
2. Remove the foot accelerator pad and floor mat.

3. Remove the center floor pan.

4. Disconnect rear of propeller shaft from differential flange.

   Remove by sliding from spline shaft.

REMOVE AND REPLACE HYDRO-MATIC DRIVE



5. Remove the flywheel housing pan.

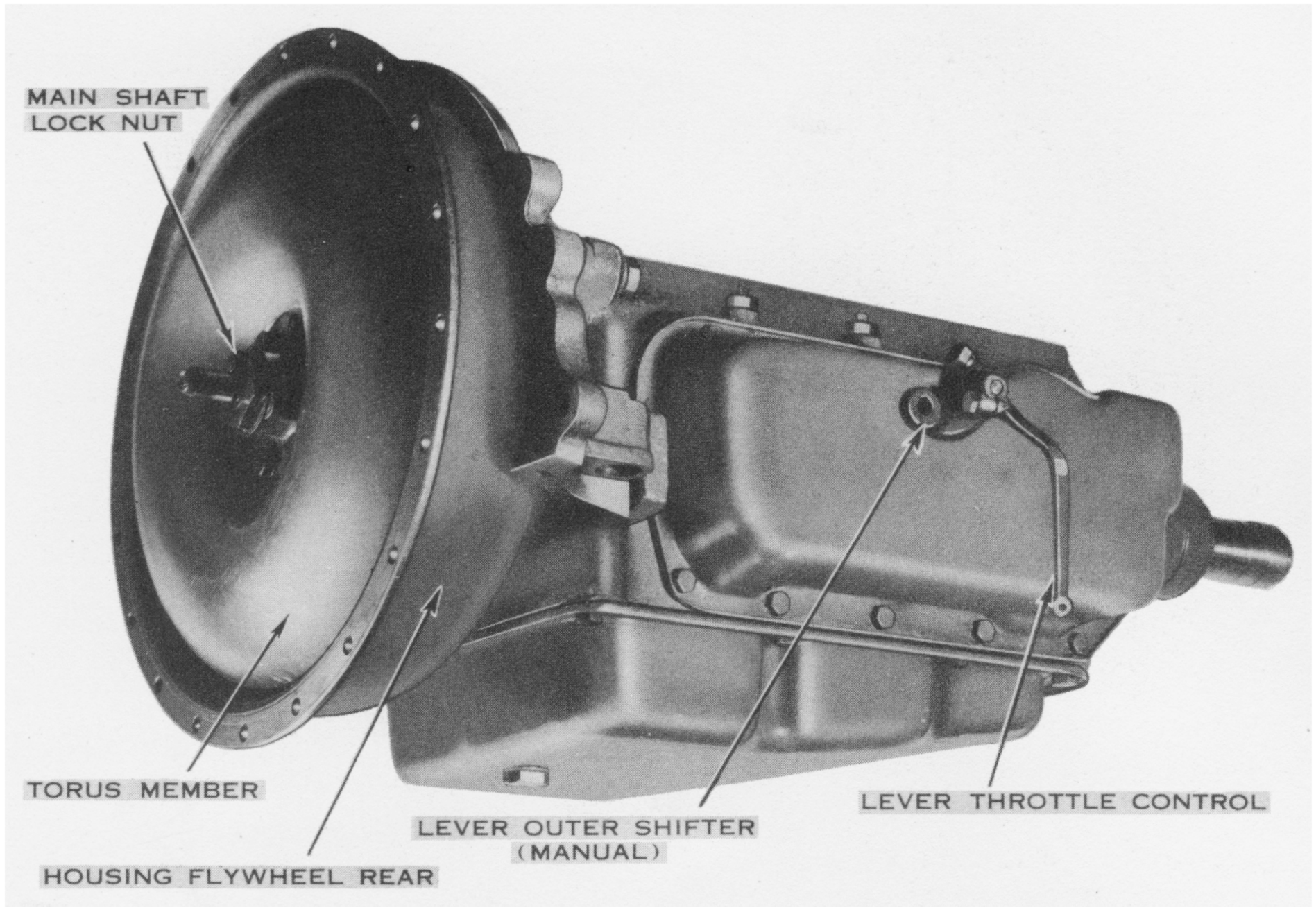
6. Drain the transmission and fly wheel cover through drain plugs.

7. Remove throttle lever from the side of transmission case. Disconnect outer shift lever (Manual) from lower control rod.

8. Remove the two upper engine mounting bolts.

9. Remove the bolt holding the brake shaft bracket to the cross member 60 - 70 model. On the 90 model, remove two bolts holding strut to lower part of master cylinder.

REMOVE AND REPLACE HYDRO-MATIC DRIVE

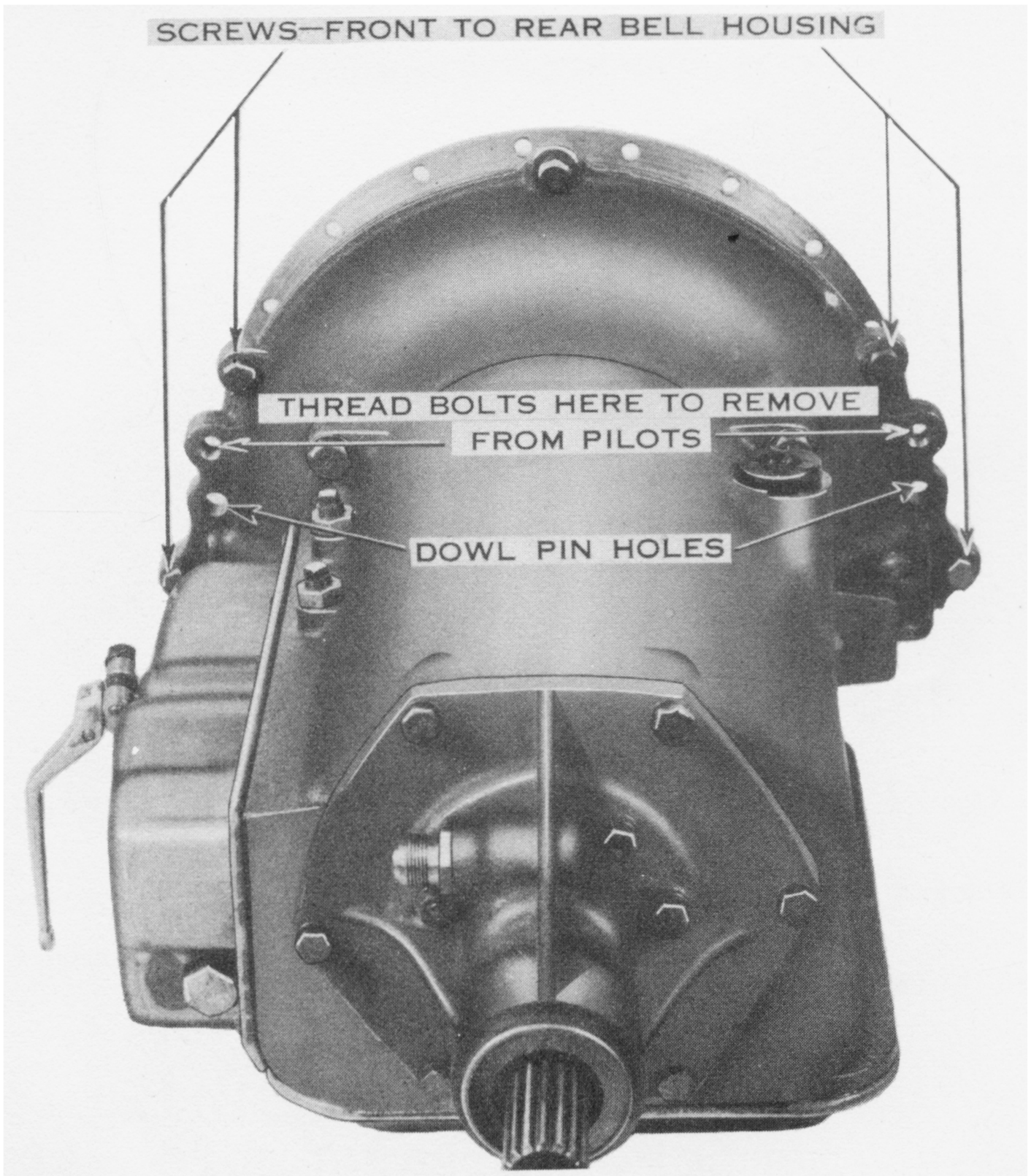


One bolt holding strut to cross member. Disassemble strut from shaft. Remove clevis pin from llower control relay rod.

10. With a block of wood held on a jack pad and held just ahead of the engine crank-case drain plug, raise the engine off its mountings approximately 1".

11. Remove three bolts from each side of cross member to frame side rails. To remove the cross member, tip the top toward the front of car in a rolling motion at the same time moving cross member forward.

REMOVE AND REPLACE HYDRO-MATIC DRIVE



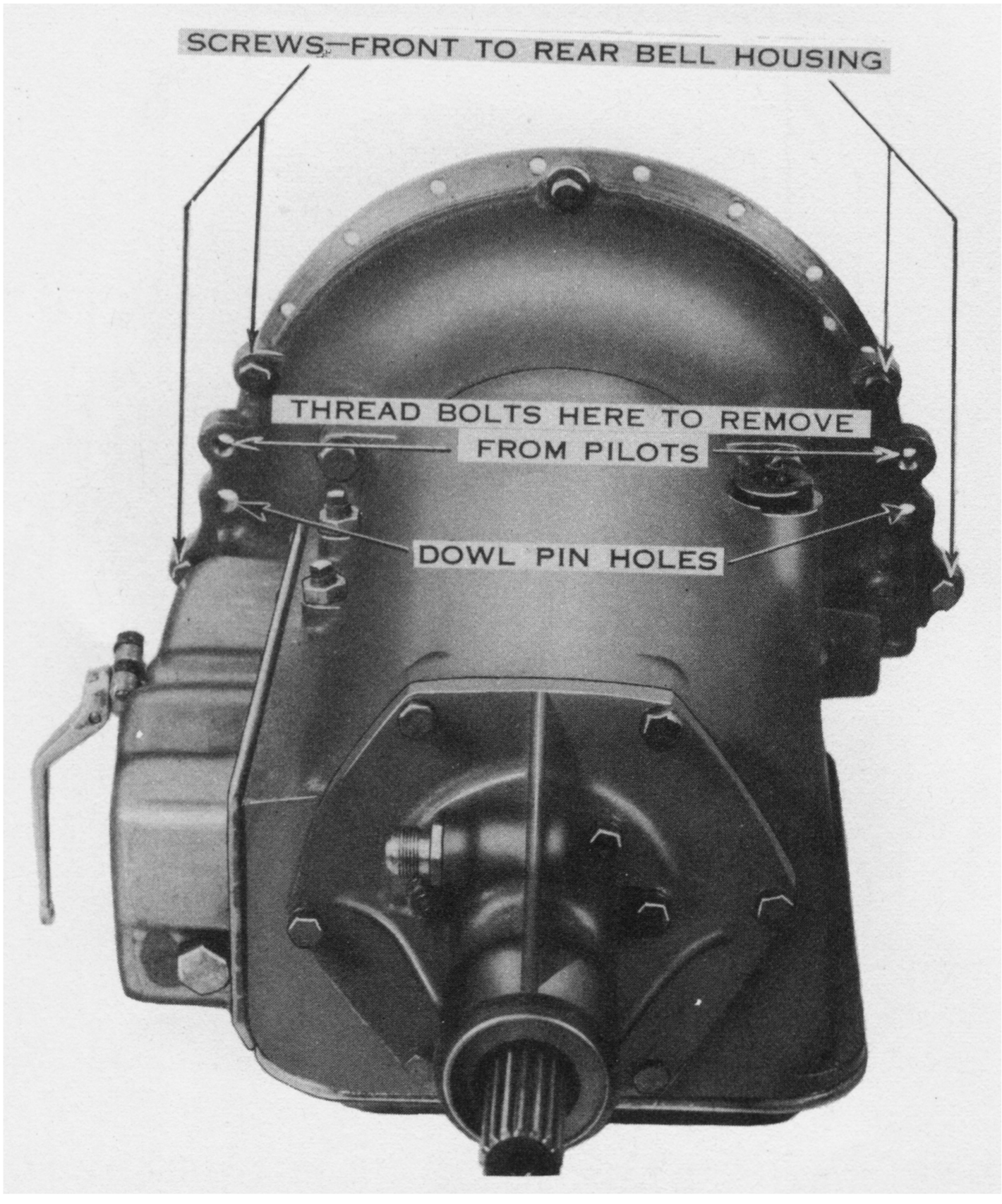
12. Place transmission lifting tool (No. J-1129) in front compartment and immediately over floor pan opening.

    Be sure to use safety extension legs (No. J-1129-40-1) on lifting tool.

13. Place the saddle at the bottom of the transmission, at the same time working the cables through the floor pan opening. Hook both cables into the snap of the lifting tool cable.

    Always center the transmission pan into saddle frame and adjust position of cables for an even pull.

REMOVE AND REPLACE HYDRO-MATIC DRIVE



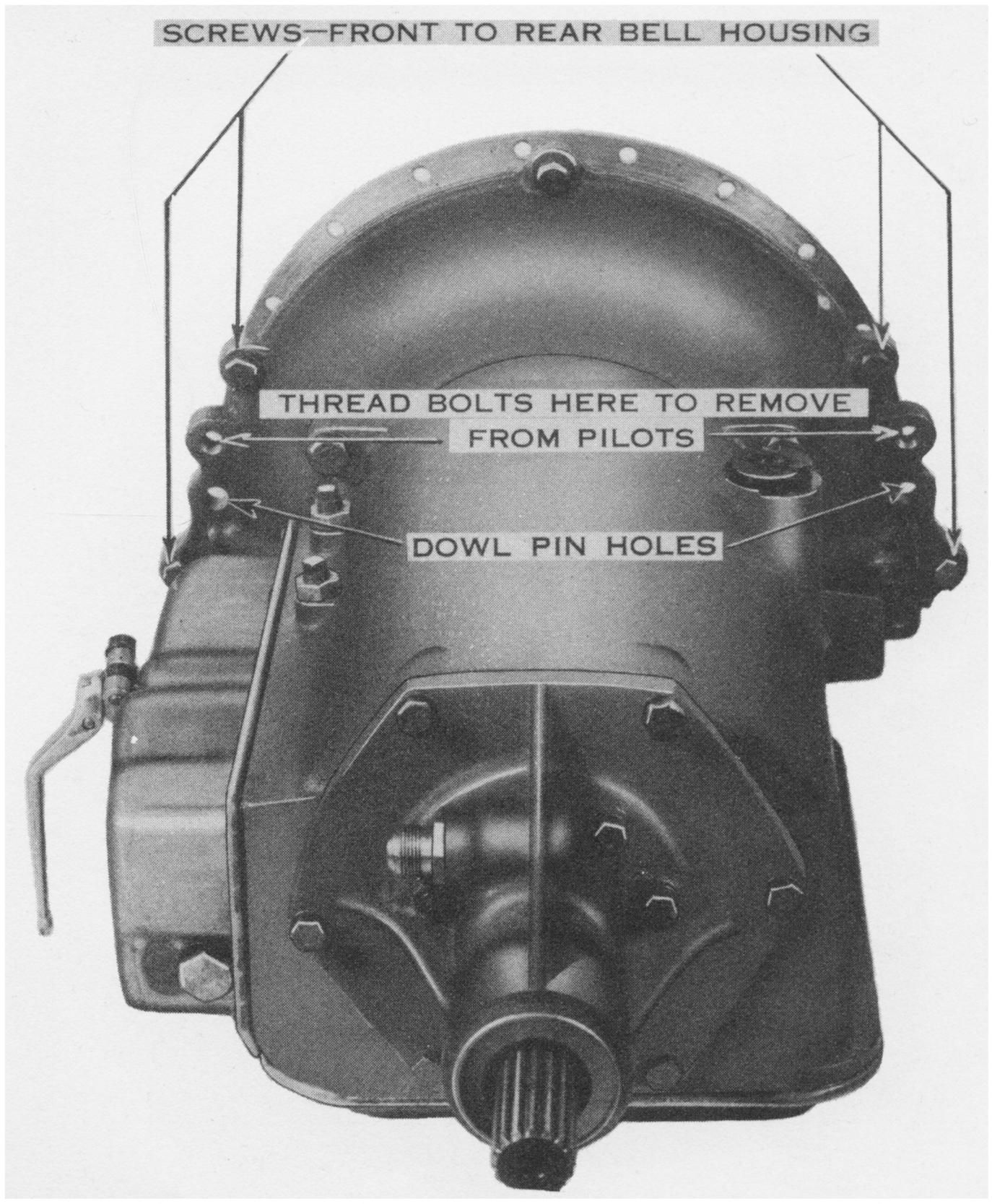
14. Hoist the transmission just enough to take the strain off of bolts.

15. Remove the twenty 5/16" bolts holding the fluid flywheel cover to the flywheel.

16. Remove the five $\frac{1}{2}$" bolts holding the rear half of the bell housing to the front half.

17. Lower the engine slightly until top of bell housing is flush with the top of opening in floor pan.

REMOVE AND REPLACE HYDRO-MATIC DRIVE



18. Thread two standard transmission bolts into bell housing - one each side just above the dowl pins.

    These are treaded in until the bell housing is forced from the dowl pins.

19. Remove the two standard transmission bolts used to force rear half of bell housing from dowl pins.

20. Remove the transmission and the rear bell housing as an assembly by moving the transmission toward the rear of the car, at the same time lowering the assembly to the floor.

REPLACING HYDRA-MATIC DRIVE

1. Be sure the face of the flywheel is thoroughly cleaned.

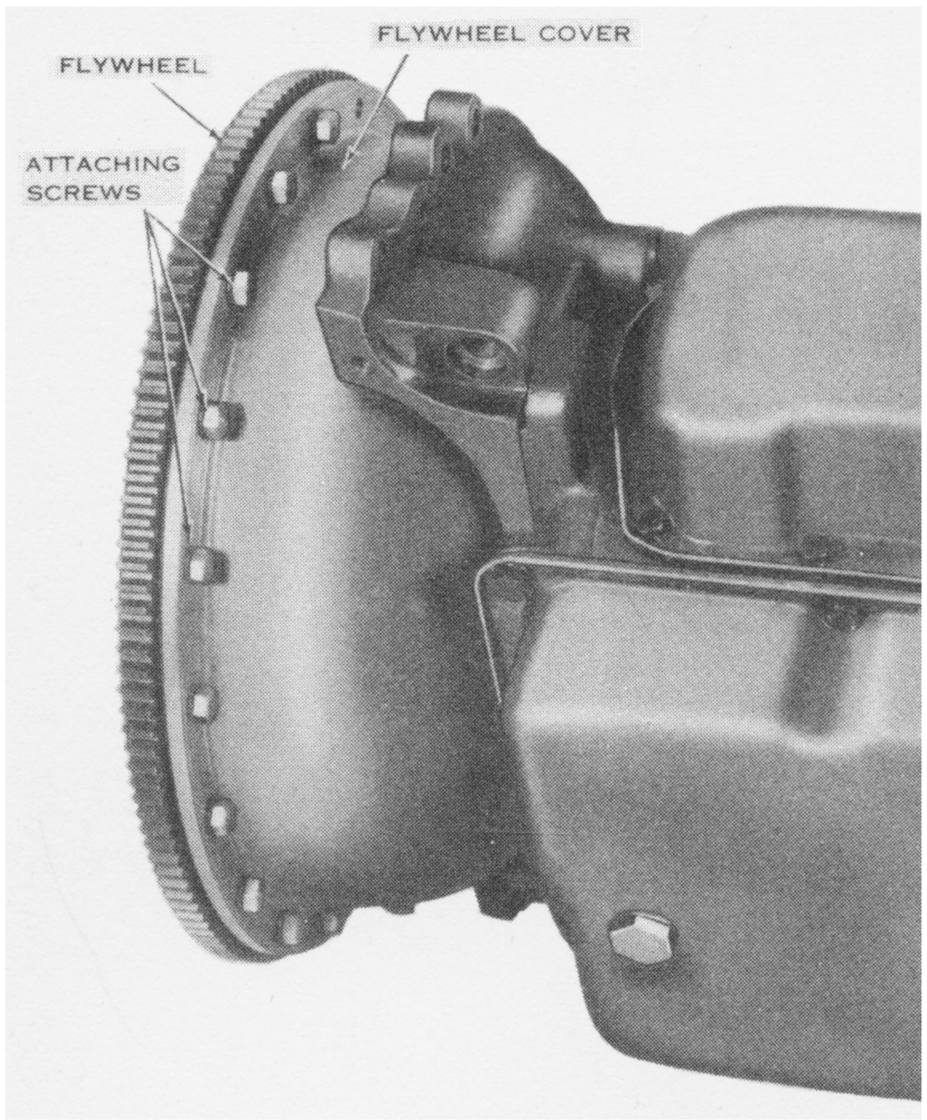
2. Place a new gasket to the face of the flywheel. It is very important that the gasket be in perfect condition, that the flywheel is free of any burrs, and a good seal is made to prevent any possible leaks at this point.

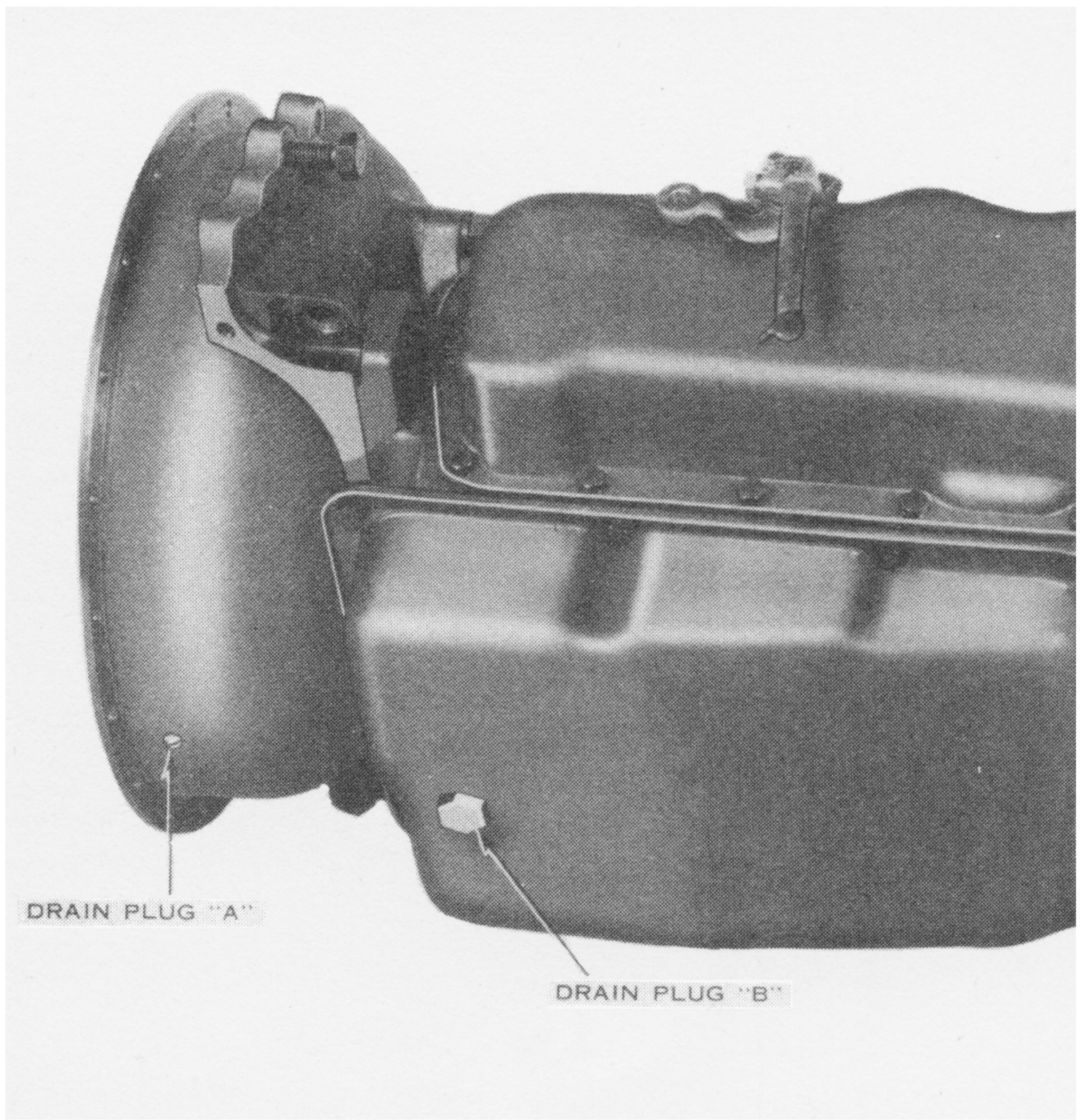
   Gasket should be held in place with white vaseline. Do not use shellac.

3. With the transmission ready to lift into place, care should be used to see that the transmission main shaft pilots into the end of the crankshaft and that the dowl pins in the rear half of the flywheel housing enter freely.

4. Insert a small punch through hole in flywheel cover to line cover up with flywheel.

REPLACING HYDRA-MATIC DRIVE





5. Tighten flywheel cover to the flywheel using twenty capscrews (3135). These capscrews should only be started in place and not tightened until bell housing has been tightened in place.

6. Tighten rear bell housing to front housing attaching screws. Then tighten with a speed wrench and finish by drawing up with a tension wrench; the 20 flywheel cover capscrews. It is very important to use a tension wrench drawing these capscrews to 30# (foot pounds) to avoid leaks or any damage being done to the capscrews. Be sure the drain plugs A and B in the flywheel cover and oil pan are tight.

7. Install the flywheel housing pan. Lift the engine to approximately 1" above its normal height.

8. Tap the frame cross member into place between the frame side rails.

REPLACING HYDRA-MATIC DRIVE

9. Tighten the cross member in place between side rails.

10. Lower the engine, being sure the motor mountings seat properly into the flywheel housing.

11. Tighten both the rear motor mounting bolts.

12. Assemble brake cross shaft bracket to cross member.

13. Install the propeller shaft.

14. Connect the speedometer cable.

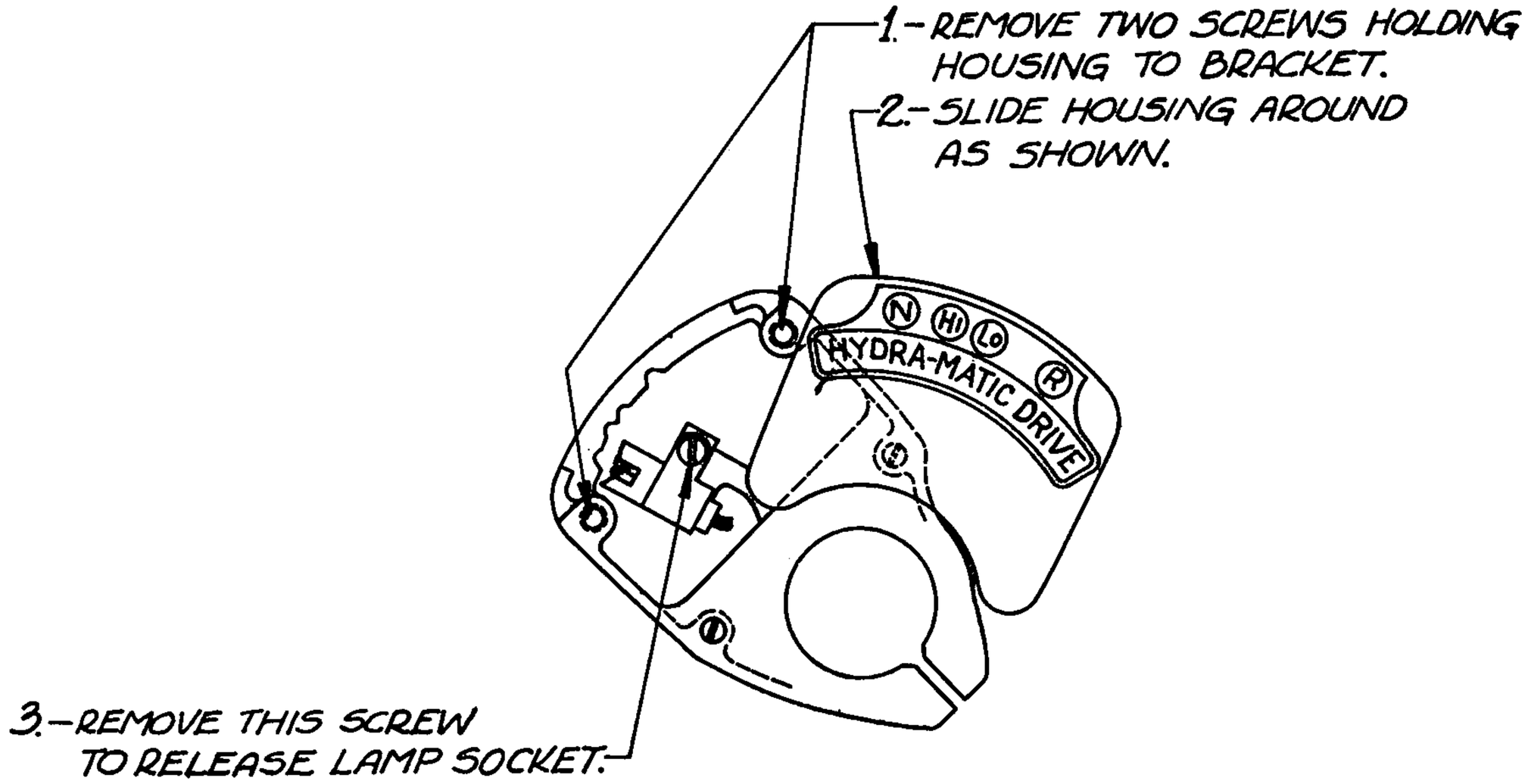
15. Install the throttle control lever to side of transmission, (be sure serrations in lever line up with those on shaft), and make all external adjustments as covered under - Adjustment Procedure.

16. Lower the car to the floor.

17. Fill the transmission with Oldsmobile HYDRA-MATIC Drive Fluid.
Note: First add six quarts of the fluid to the transmission.
Then run the engine for approximately five minutes, transmission in neutral. Now add four more quarts of the fluid, making a total of ten quarts. Fluid is supplied to the fluid flywheel housing from the transmission.

8

REPLACING LIGHT BULB IN SHIFT CONTROL


1.-REMOVE TWO SCREWS HOLDING HOUSING TO BRACKET.
2.-SLIDE HOUSING AROUND AS SHOWN.
N HI Lo R
HYDRA-MATIC DRIVE
3.-REMOVE THIS SCREW TO RELEASE LAMP SOCKET.

The HYDRA-MATIC Drive direction-control lever located just below the steering wheel is equipped with a small light bulb. At night, a soft light illuminates the position in which the lever is set.

To install a new bulb:

Remove two cover attaching screws.

Remove cover by sliding off.

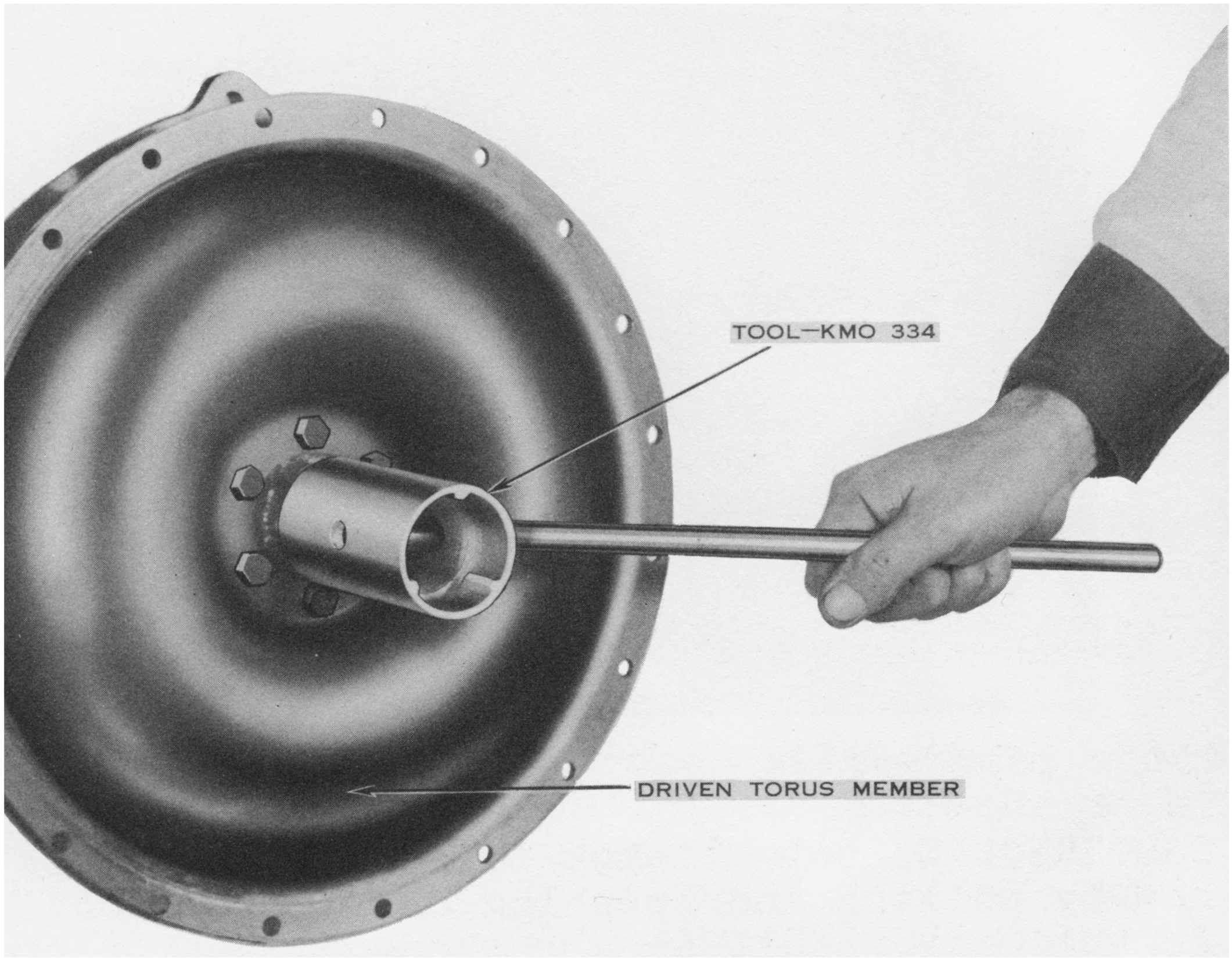
Remove small screw holding socket to bracket.

Remove dome from socket.

Remove bulb.

C

MAJOR SERVICE



1. Move outer shifter lever (manual control) in the reverse position.

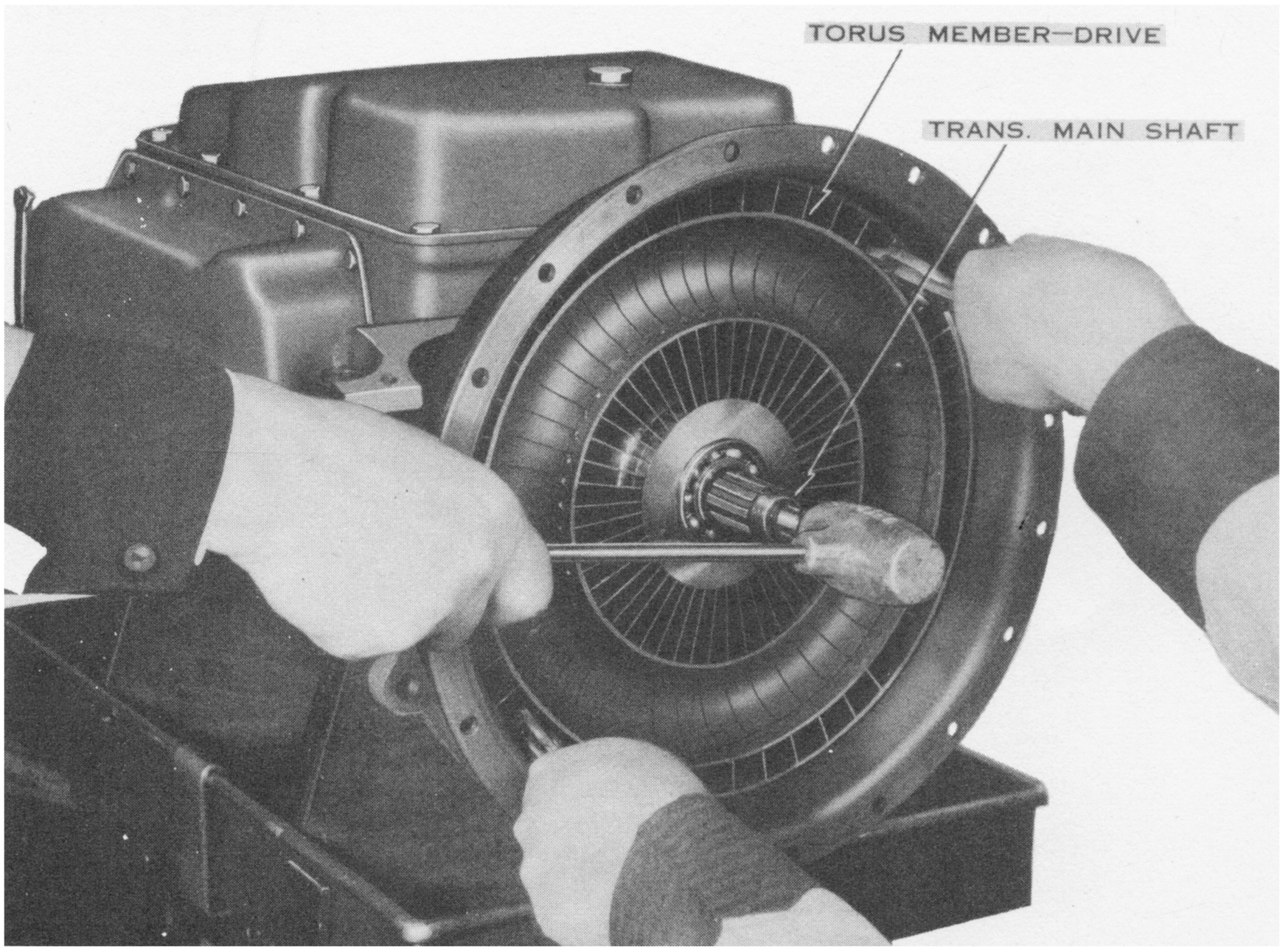
2. Loosen main shaft lock nut washer.

3. Remove main shaft lock nut using tool K.M. O. 334.

4. Slide driven member from main shaft.

5. Remove drive member.

REMOVE DRIVE AND DRIVEN MEMBER



CAUTION: Do not attempt to remove drive member by pulling and pushing on flywheel cover as this may result in a broken oil seal ring.

6. Grip the vanes of drive member with pliers pulling forward.

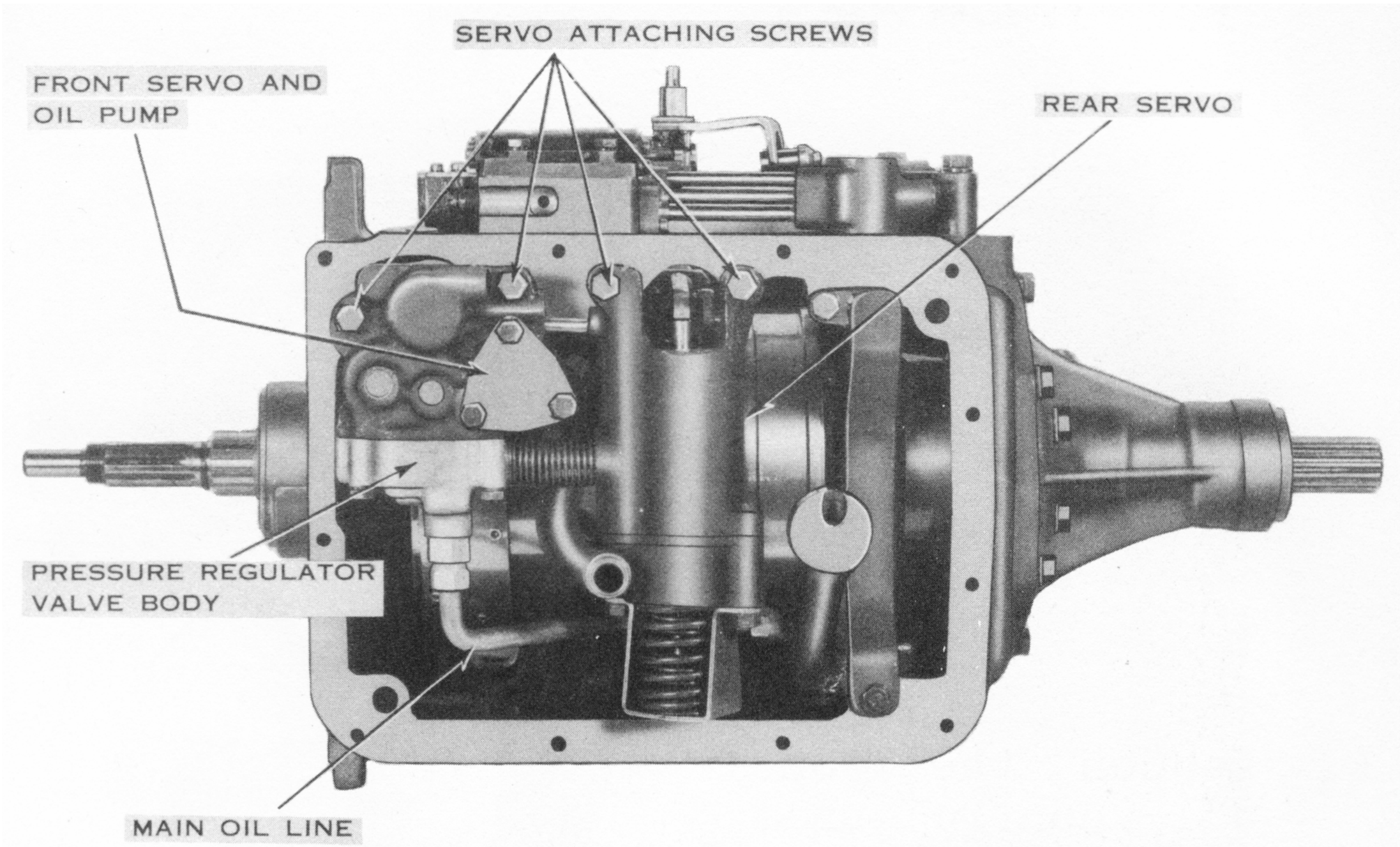
7. Strike tapping blows on end of main shaft with bronze hammer.

8. Remove rear half of bell housing from transmission.

9. Remove oil pan.

10. Remove side cover.

REMOVE SERVOS



1. Remove main oil line.
   Hold coupling in the valve body while this end of line is loosened to avoid damage to front connection.

2. Remove oil pressure regulator valve and body.

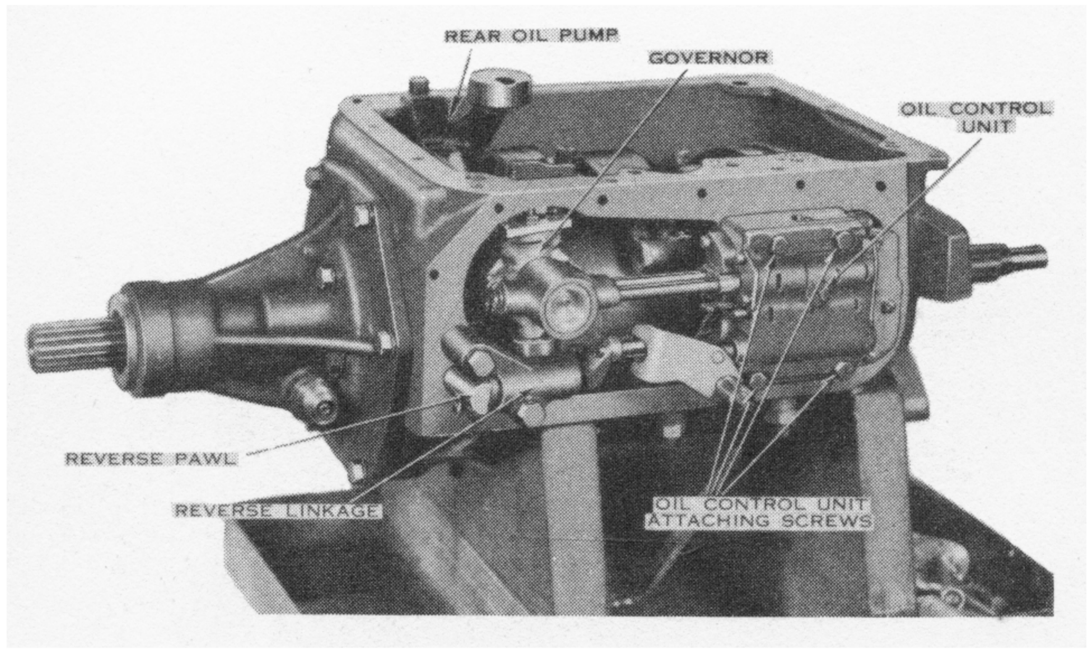
3. Remove two oil delivery pipes from front cover, remove cover.

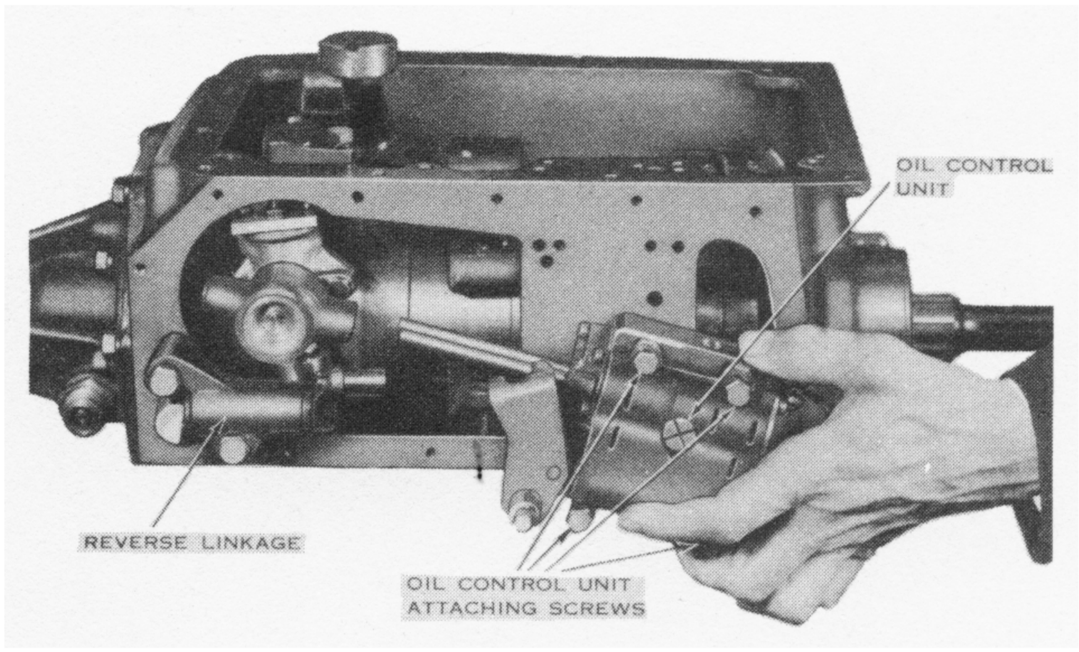
4. Loosen the rear servo adjusting screw only.

5. Loosen four servo to transmission case attaching screws.

6. Remove front and rear servo as one unit.

REMOVE MAIN OIL CONTROL VALVE BODY





1. Loosen the four oil control unit attaching bolts.

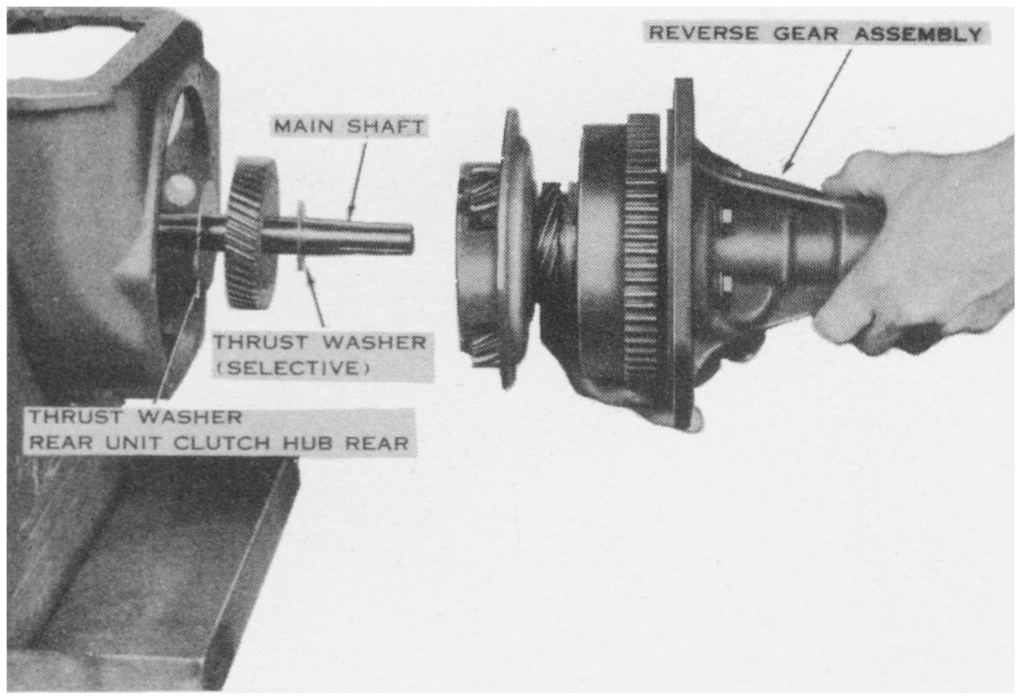
   CAUTION: Leave the four bolts in the oil control unit to prevent body separating. (Keep as one unit.)

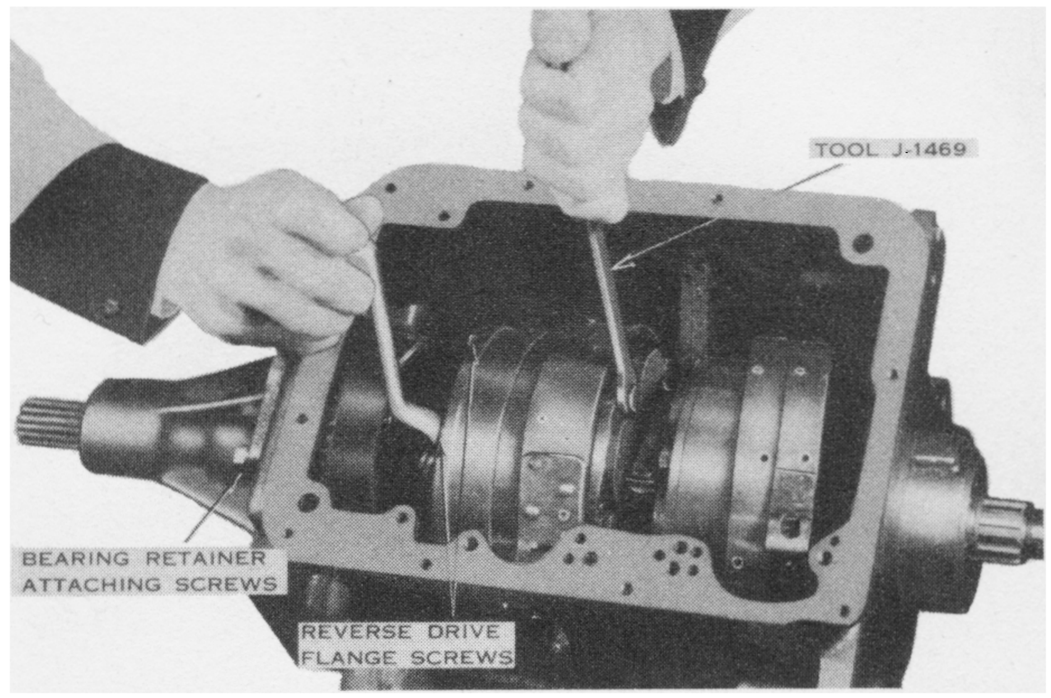
2. Slide oil control unit away from governor along transmission case and toward the front of transmission.

3. Remove reverse linkage and pawl from the side of transmission.

4. Remove rear oil pump and governor assembly. This can be removed by keeping the round governor weight toward the front of transmission while removing.

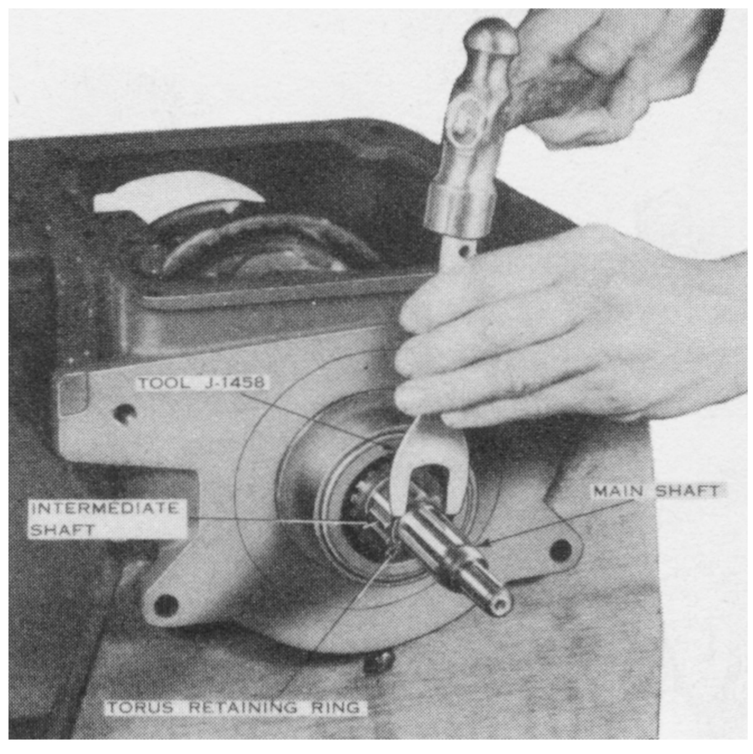
REMOVE REVERSE GEAR ASSEMBLY





1. Remove six reverse drive flange attaching bolts. Hold rear unit with tool J-1459.

2. Remove six bearing retainer to transmission attaching screws.

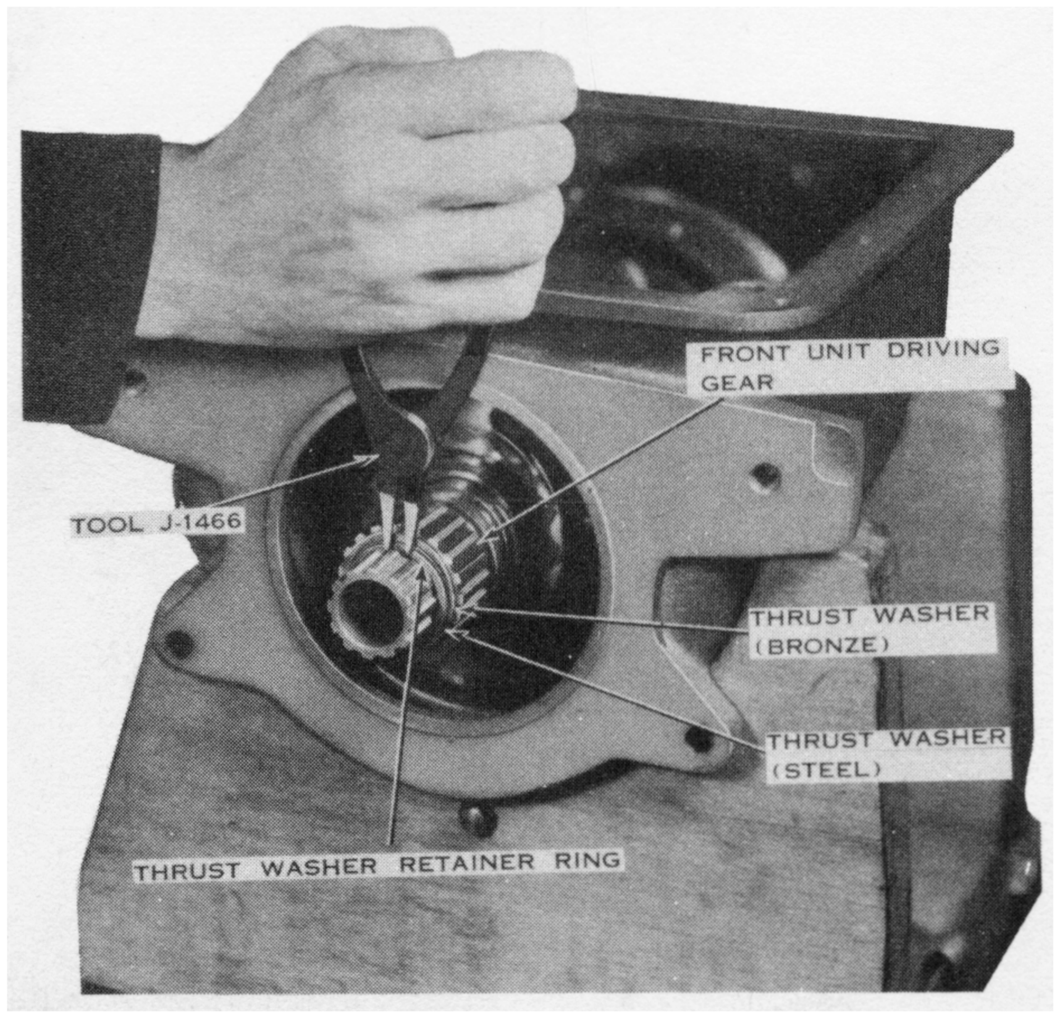


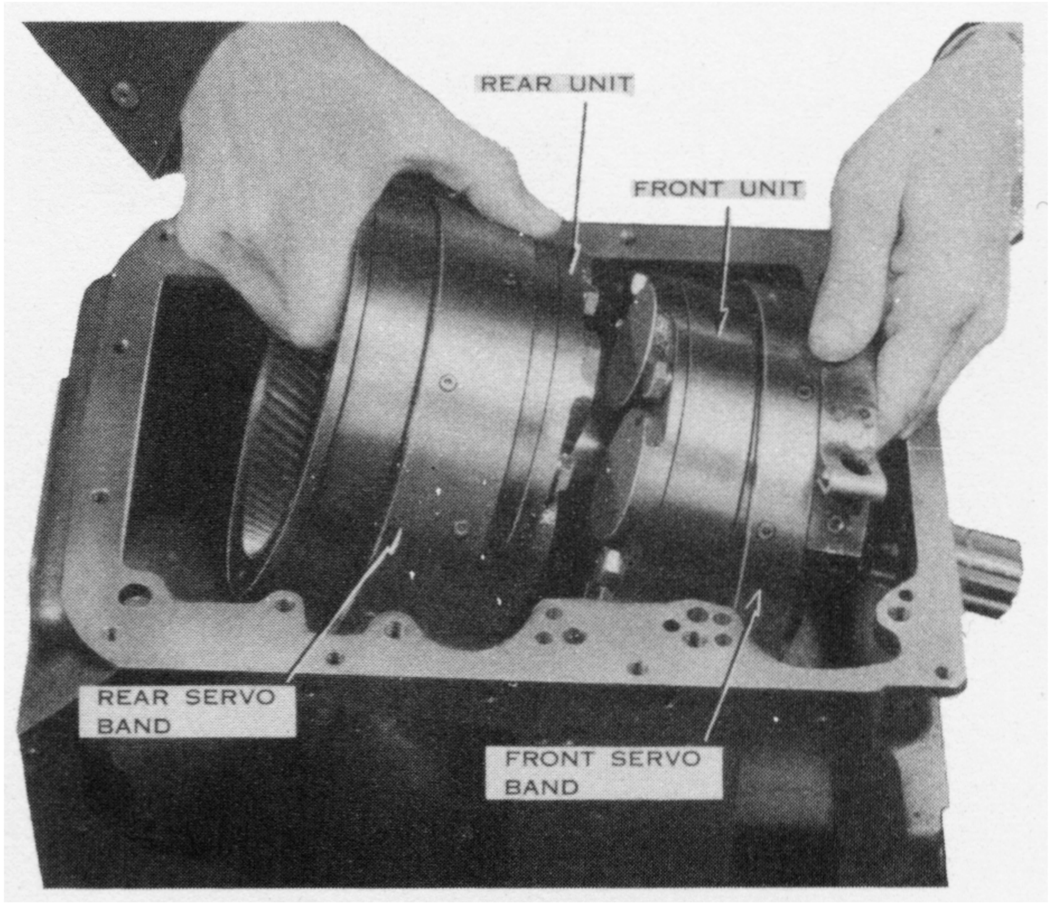
3. Remove reverse gear assembly from rear of transmission case.

4. Remove torus retainer ring from front end of transmission main shaft using tool J-1458.

5. Remove the main drive shaft.

REMOVE FRONT UNIT DRIVE GEAR ASSEMBLY





1. Remove thrust washer retainer ring using tool J-1466.

2. Remove steel and bronze thrust washers.

3. Remove front unit drive gear.

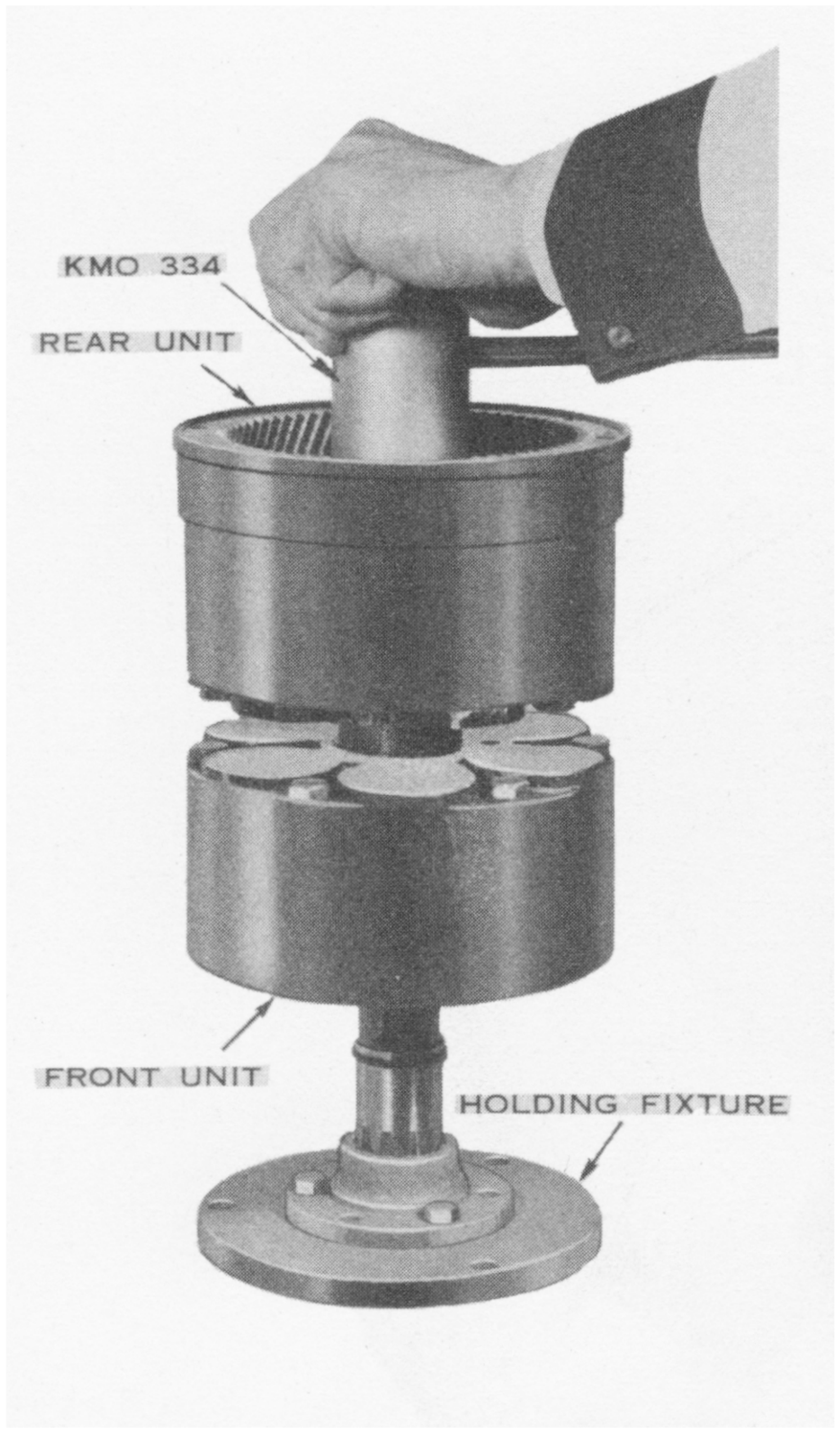
Remove Front and Rear Units

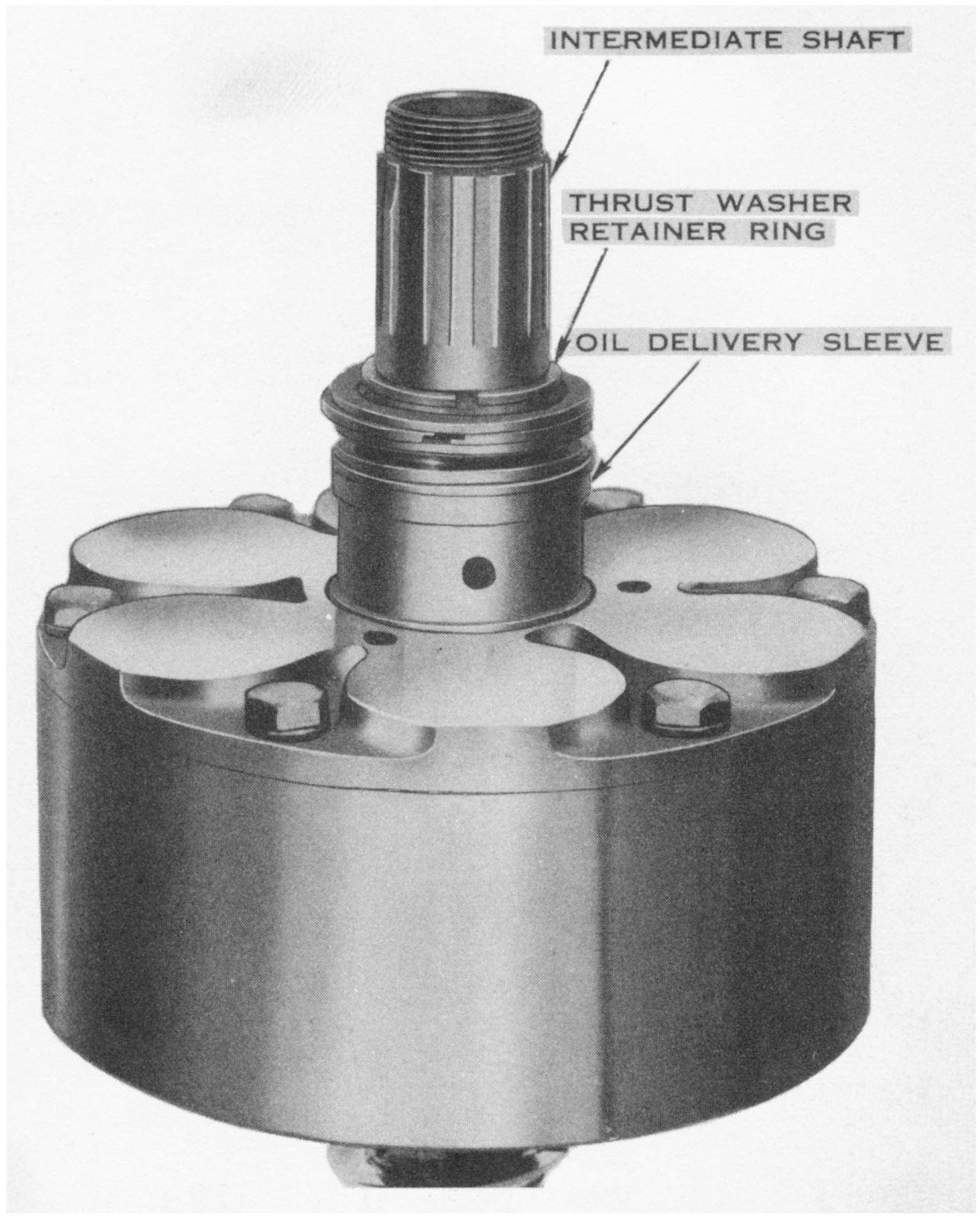
1. Remove two center bearing attaching bolts.

2. Remove center bearing cap.

3. Remove both units from transmission case.

REMOVE REAR UNIT FROM SHAFT





Place unit assembly in holding fixture J-1463.

1. Remove rear unit clutch hub nut using tool K.M.O. 334.

2. Remove rear unit from shaft.

   CAUTION: Extreme care should be used that none of the 68 roller needle bearings are lost.

3. Remove roller needle bearing inner sleeve, roller bearing washer and retainer ring.

4. Remove oil delivery sleeve.

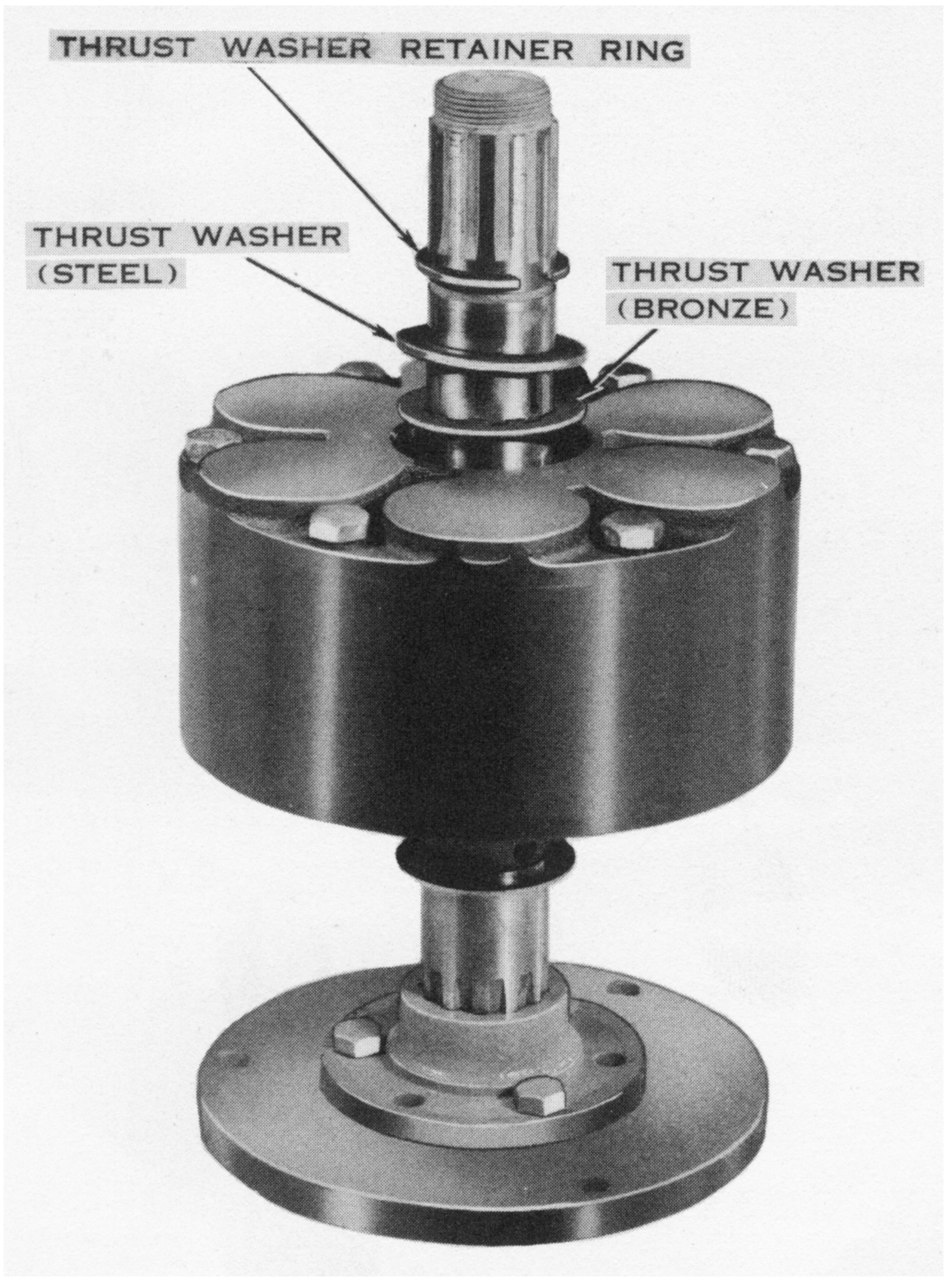
REMOVE FRONT UNIT FROM SHAFT

1. Remove front unit thrust retainer.

2. Remove front unit steel and bronze thrust washer.

3. Remove assembly from intermediate shaft.

DISASSEMBLE FRONT AND REAR UNIT



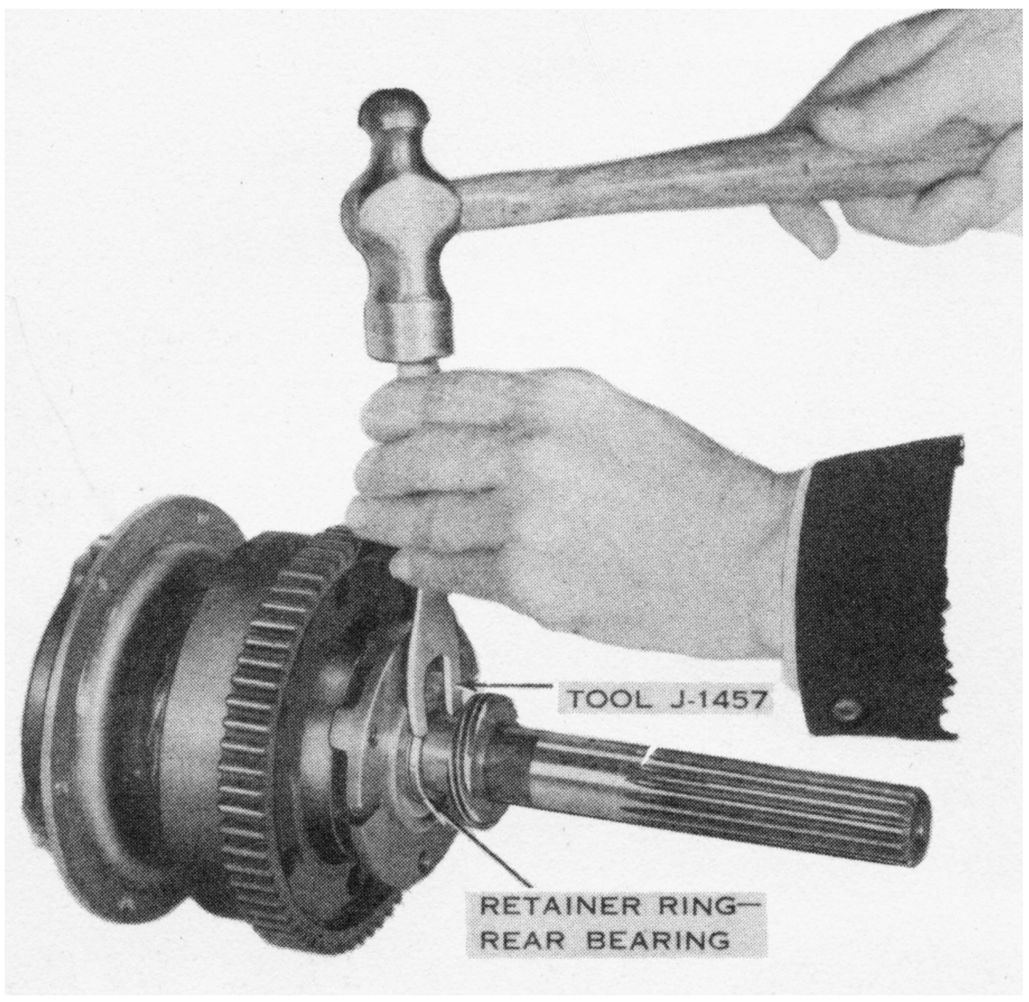
1. Remove cap screws holding units together

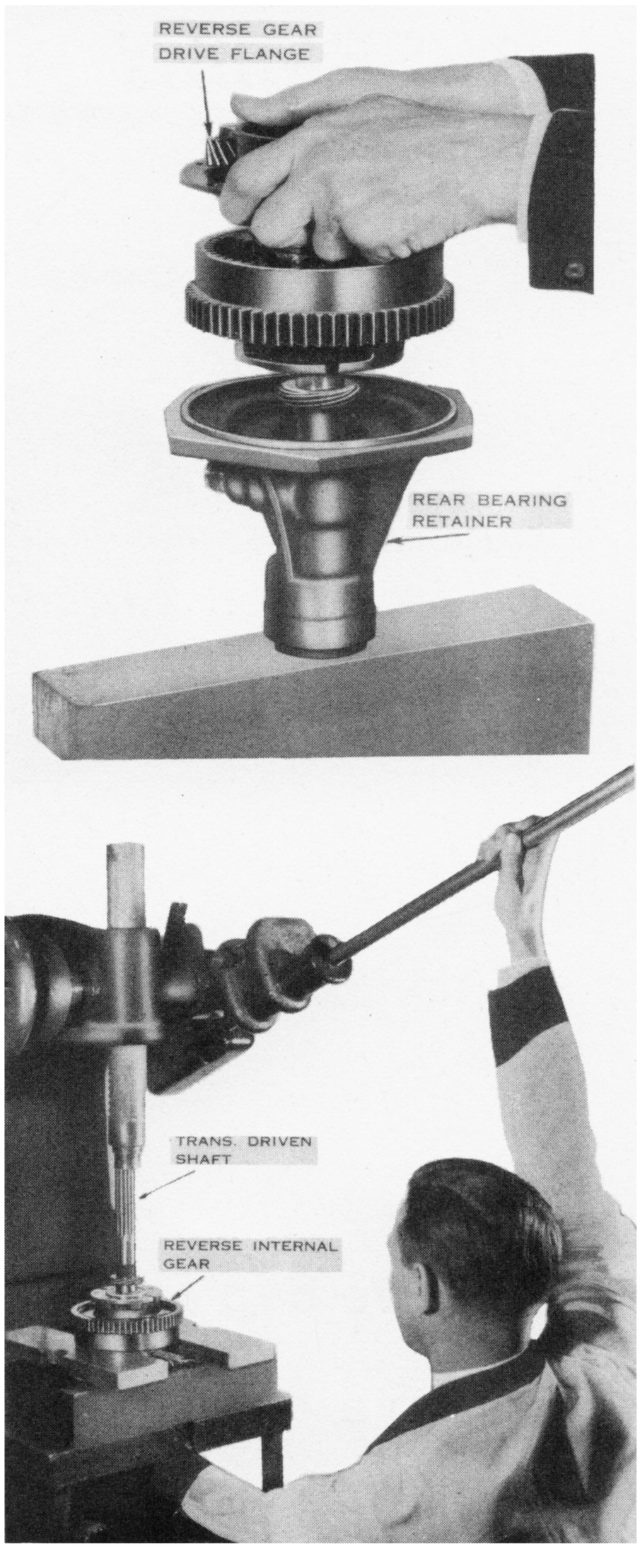
2. Remove the clutch drums.

3. Remove clutch release springs. Springs in the front unit are shorter than those in the rear unit.

4. Remove bronze and steel plates. The front unit has 4 steel and 5 bronze plates. The rear unit has 9 steel and 10 bronze plates.

DISASSEMBLE REAR BEARING RETAINER, REVERSE GEAR ASSEMBLY





1. Remove bearing retainer to reverse internal gear support attaching bolts.

2. Hold reverse gear drive flange and tap end of shaft on block of wood.

3. Remove rear bearing retainer ring using tool J-1457.

DISASSEMBLE REAR BEARING RETAINER, REVERSE GEAR ASSEMBLY

4. Place rear bearing assemble in press. Extreme care should be used being sure support is taken on outer edge of reverse internal gear.

5. Press transmission shaft through speedometer drive gear and rear bearing.

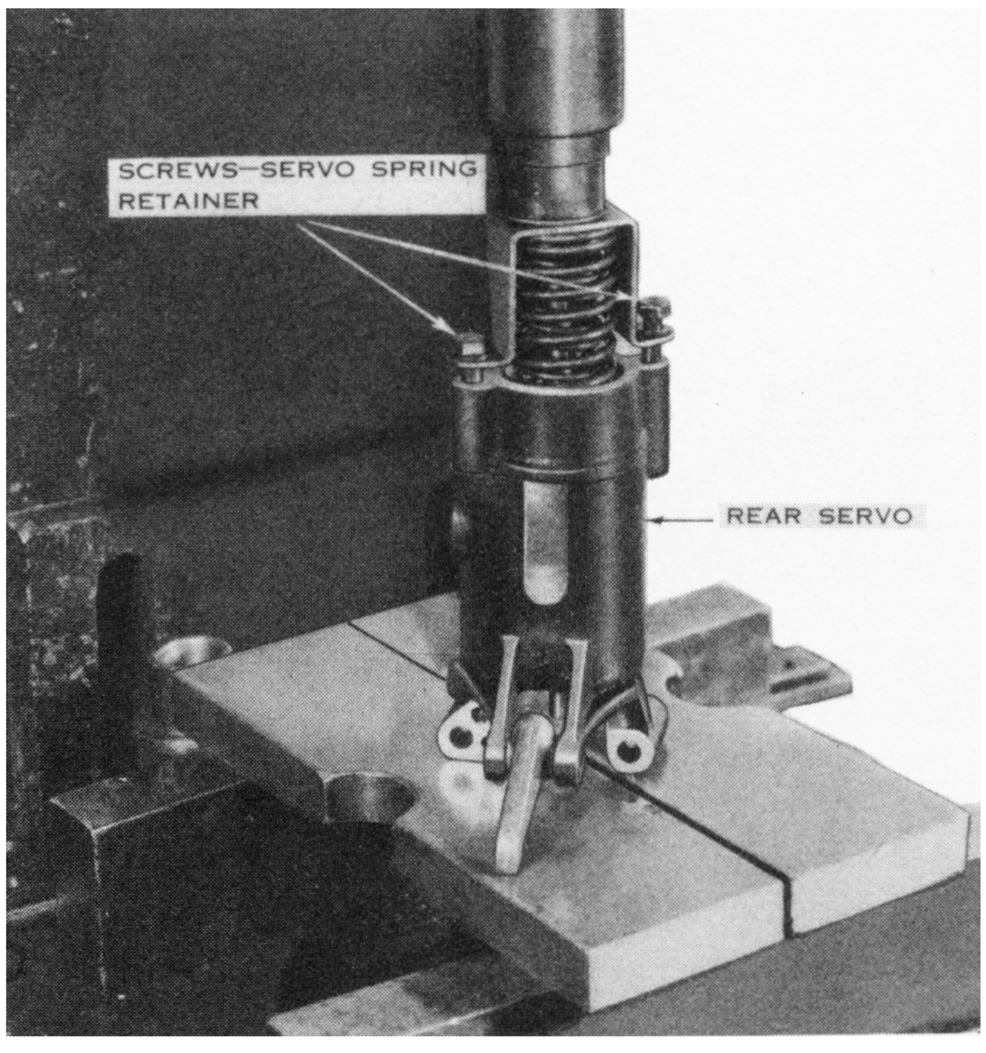
6. Remove reverse internal gear from brg. support by removing retainer ring.

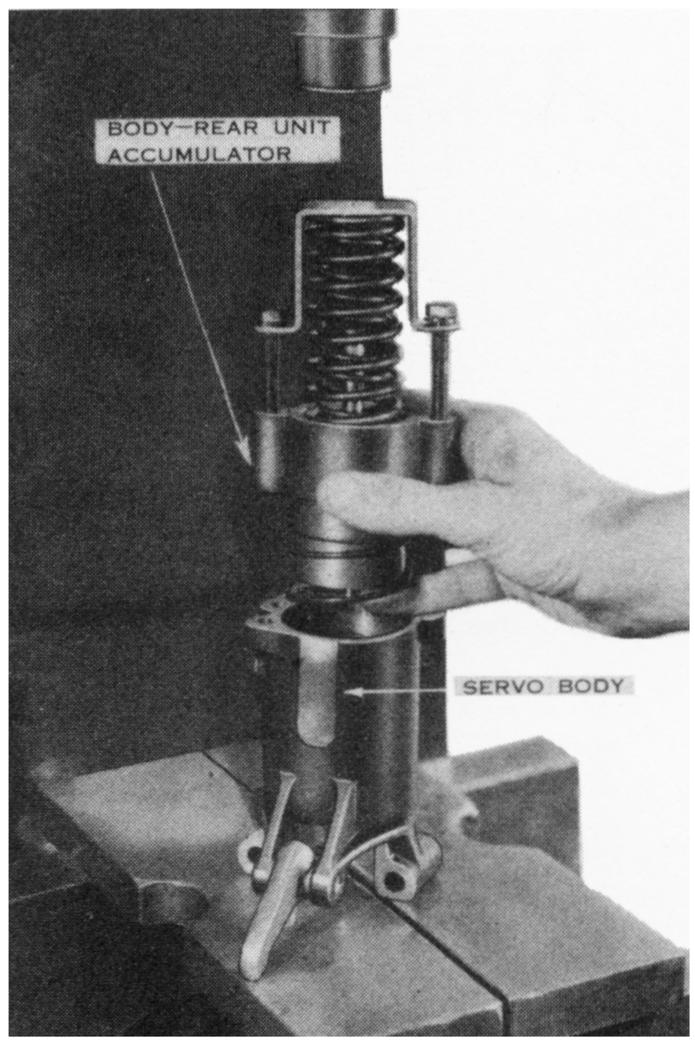
7. Remove reverse planet assembly.

8. Remove thrust washer retainer ring.

9. Remove center gear and reverse drive flange.

DISASSEMBLE REAR SERVO





1. Place servo into press, held in a steady, square position.

2. While holding tension on spring retainer remove retainer screws.

3. Release the press slowly at the same time guide servo body.

<u>Disassemble Front Servo and Oil Pump Assembly</u>

1. Remove suction line.

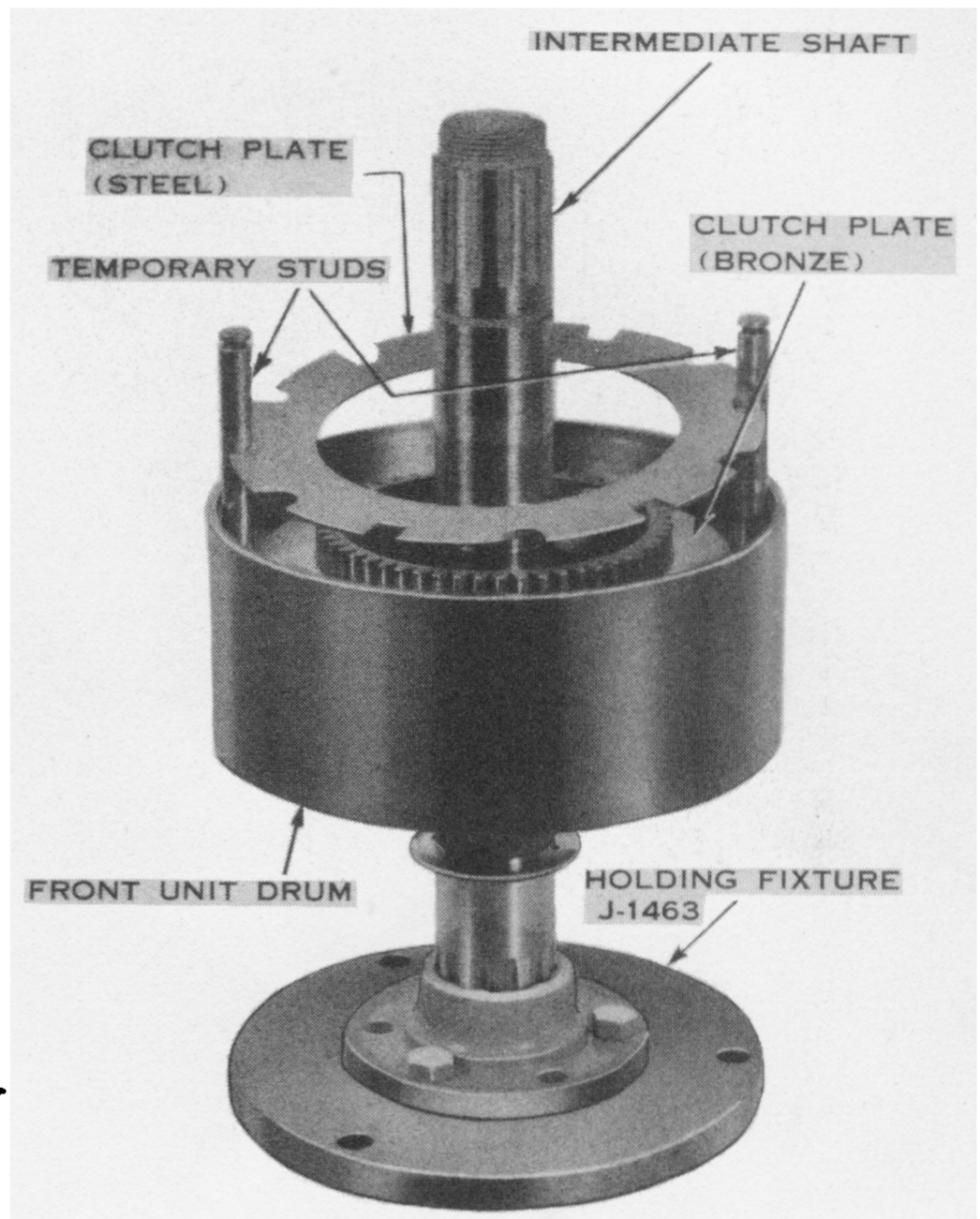
2. Remove pump cover to housing attaching bolts.

3. Remove pump cover.

4. Remove servo pistons, springs and oil pump gear.

REASSEMBLE HYDRA-MATIC TRANSMISSION

ASSEMBLE FRONT PLANETARY UNIT



1. Place intermediate shaft into holding fixture J-1463.

2. Install front unit drum over clutch hub to rest on planet gears.

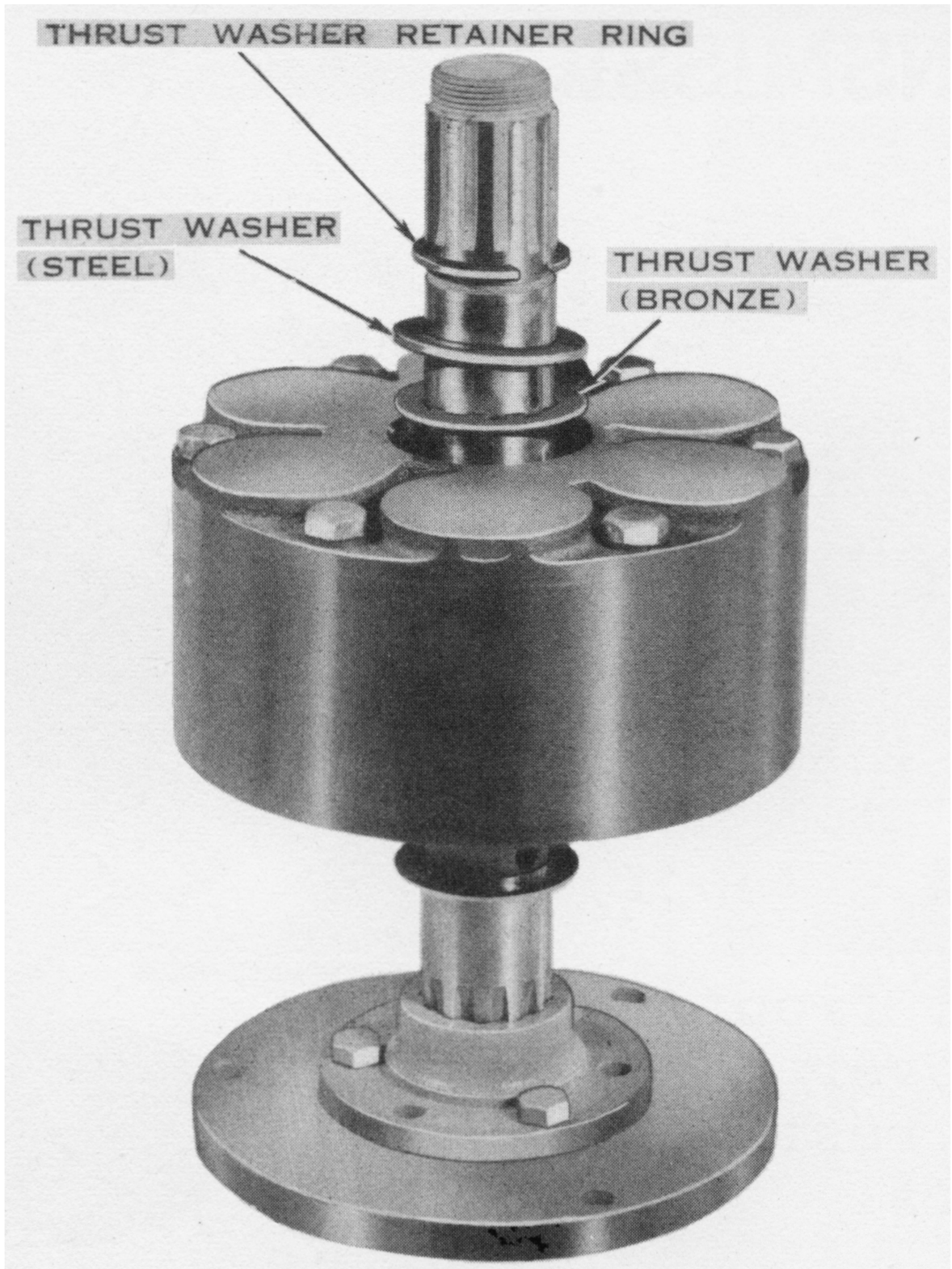
3. Temporarily insert two studs as guides for clutch plates.
   Note: When assembling units start with a bronze plate and finish with a bronze plate. The steel plates should be assembled so the dish is toward center of transmission.

4. Assemble bronze and steel plates into drum.

5. Assemble six clutch release springs into drum short, springs being used in the front drum.

The front unit has 4 steel plates and 5 bronze plates.

ASSEMBLE FRONT PLANETARY UNIT



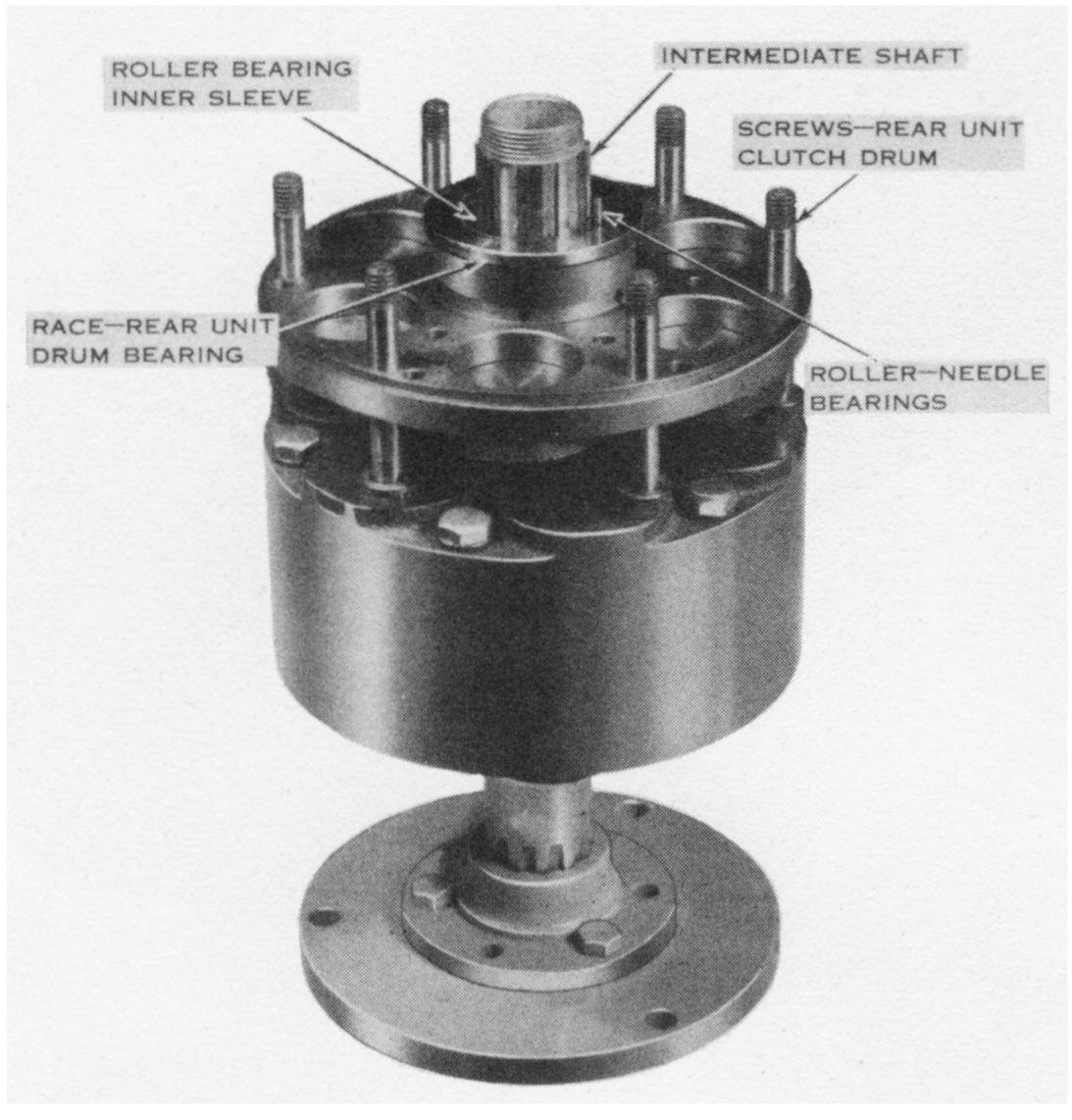
6. Assemble clutch pressure plate in place over springs.
   Properly locate the springs into the counter bores of clutch pressure plate with a small pointed center punch through holes in plate.

7. Install the clutch drum over the aligning studs and tighten the attaching screws in place.

8. Install bronze thrust washer, steel washer and snap ring.
   Note: The steel washer has a small lug, it is very important that this lug is installed over the flat portion of shaft.

9. Install oil delivery sleeve, do not damage oil seal rings.

ASSEMBLE REAR PLANETARY UNIT



1. Install thrust washer retainer ring in place on shaft.

2. Install roller bearing retainer washer over shaft, next to retainer ring.

3. Assemble cap screws with lock washers into clutch drum. Hold screws in place temporarily with rubber band.

4. Install clutch drum over intermediate shaft. Care should be used not to damage oil seal rings.

5. Install roller bearing inner sleeve over shaft.

6. Assemble 68 roller bearings into place between inner sleeve and drum race.

ASSEMBLE REAR PLANETARY UNIT

7. Install roller needle bearing retainer washer.

8. Install bronze thrust washer into clutch hub.

9. Install clutch hub.

10. Install rear unit clutch hub lock over shaft. Be sure small lug is down and in place in splines.

11. Tighten nut with tool H.M.O. 334.

12. Lock the rear unit clutch hub washer using center punch through hole in clutch hub.

ASSEMBLE REAR PLANETARY UNIT

13. Install clutch pressure plate over attaching screws.

14. Assemble bronze and steel plates over attaching screws starting with a bronze and finishing with a bronze plate. Be sure dish in steel plates face center of transmission.

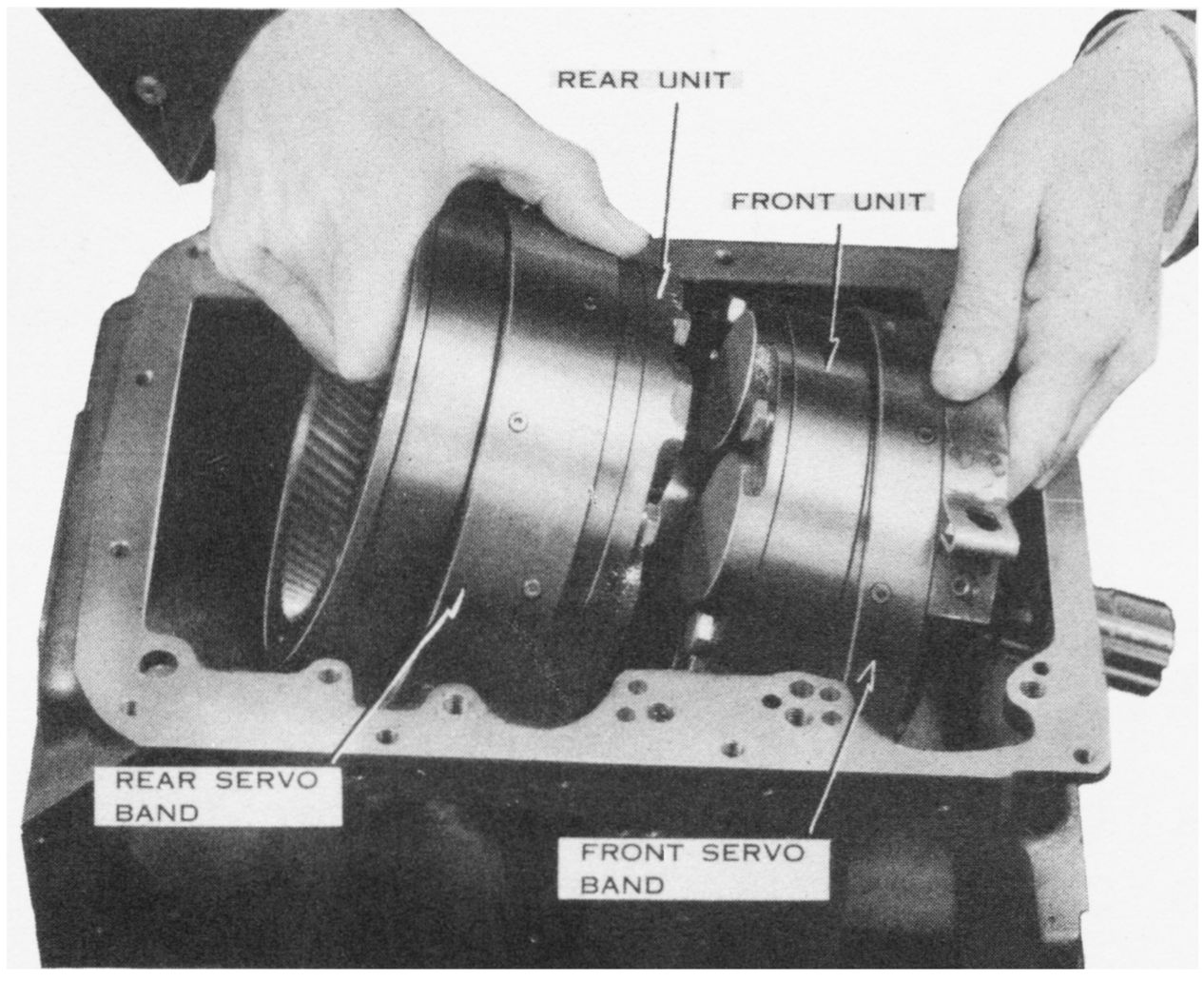
15. Assemble clutch release springs in place on clutch plate.

16. Assemble rear unit brake drum over hub and clutch release-spring.

Rotate the brake drum back and forth until it is felt that the clutch release springs are properly seated into the counter bores.

There are 9 steel and 10 bronze plates in the rear unit.

ASSEMBLE FRONT AND REAR PLANETARY UNITS INTO TRANSMISSION CASE



1. Assemble front and rear unit bands over drums.

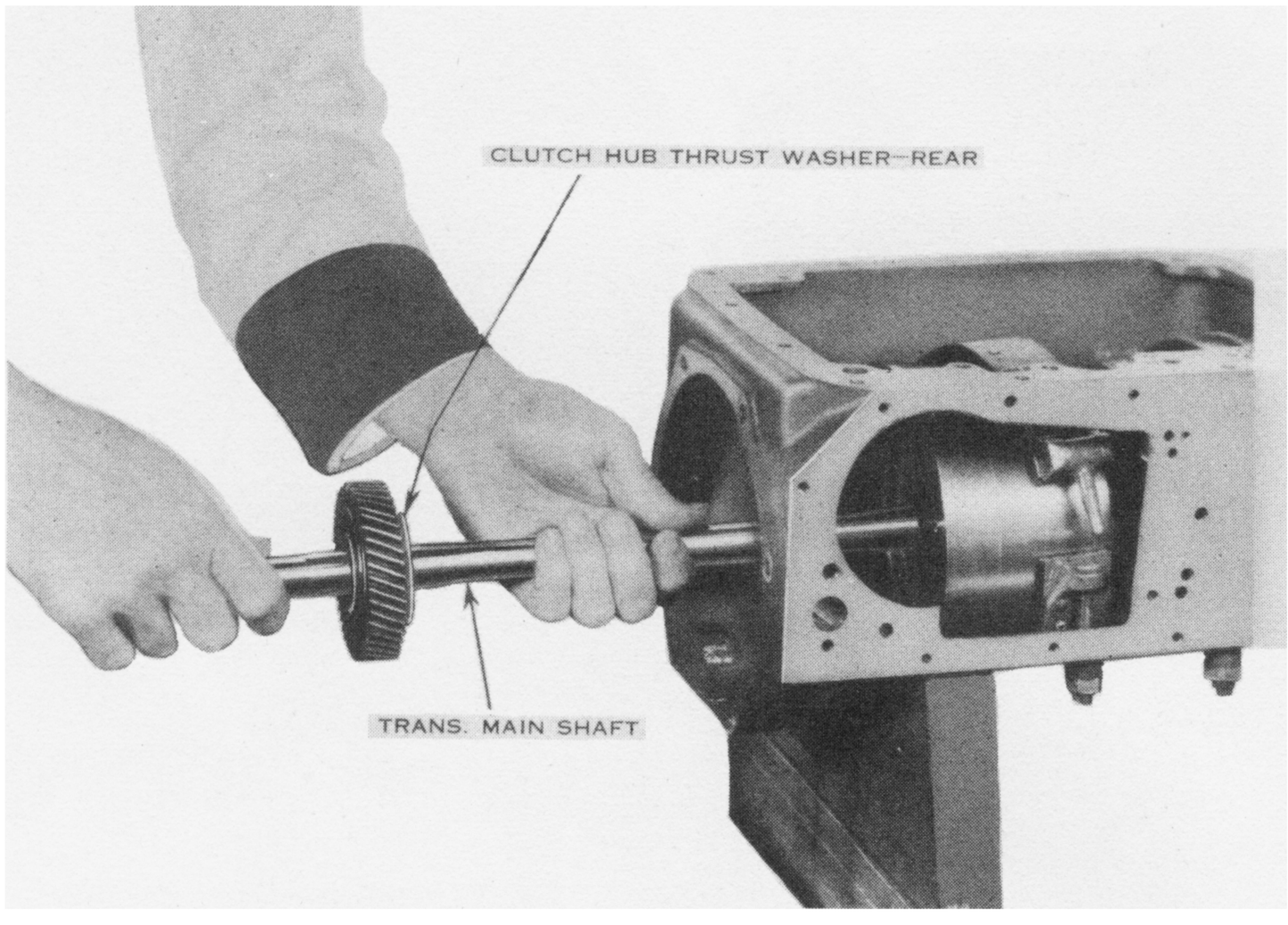
   Note: The front unit band (double wrap) must be assembled with the short anchor over servo adjusting screw.

2. Assemble units into transmission case. Be sure single hole in oil delivery sleeve is facing up and centered between holes in center journal.

3. Assemble center bearing cap in place entering dowl pin in oil delivery sleeve.

4. Tighten bearing cap in place being sure attaching bolts are locked by turning up ends of lock.

ASSEMBLE UNITS INTO TRANSMISSION CASE



5. Install the transmission main shaft into the intermediate shaft.

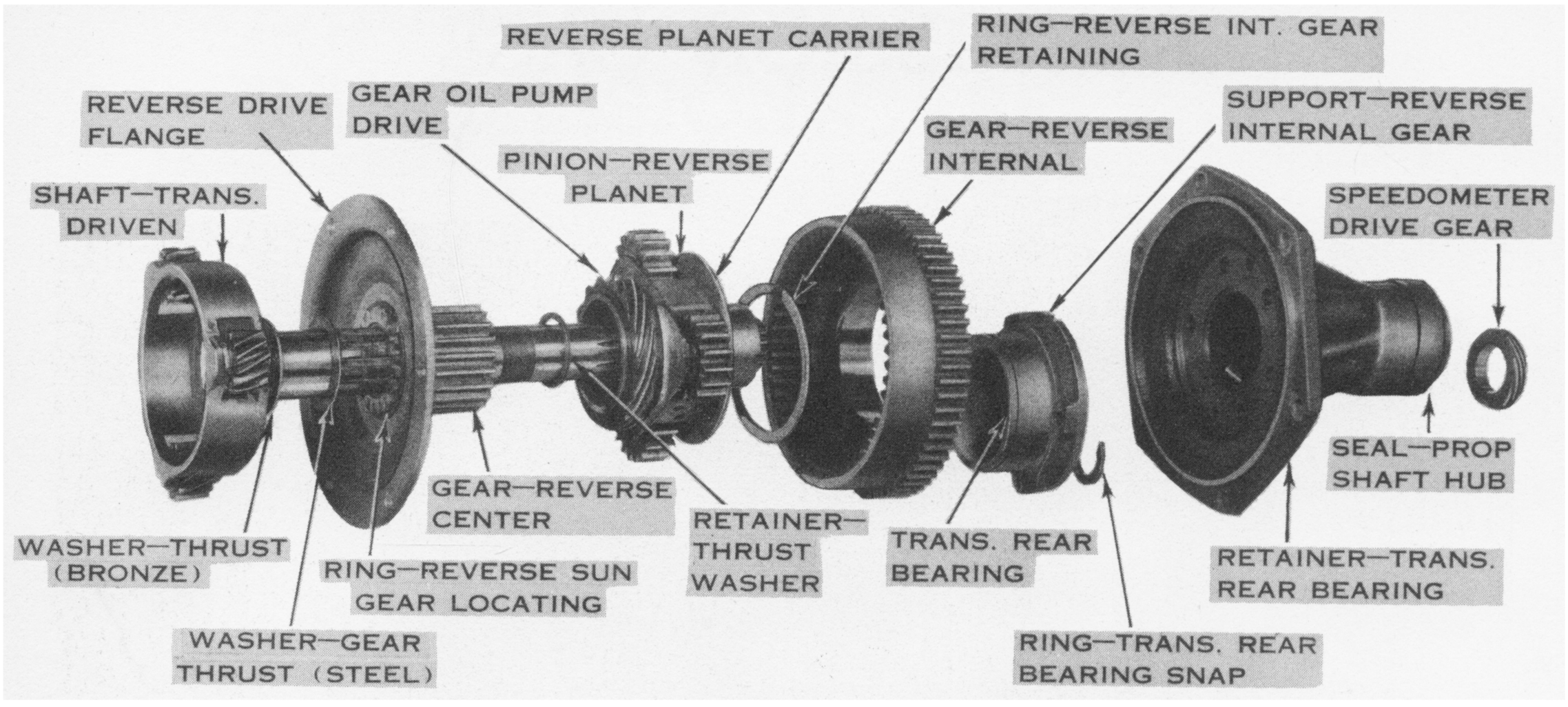
   When installing main shaft, center the oil seal ring on shaft, so it will enter the intermediate shaft freely. Be sure that the rear clutch hub thrust washer is in place.

6. Install front unit drive gear.

   Center the oil seal rings on the intermediate shaft holding in place with white vaseline.

7. Assemble bronze washer and steel washer in place over intermediate shaft against face of front unit drive gear.

ASSEMBLE REVERSE GEAR ASSEMBLY



1. Install bronze thrust washer.

2. Install steel washer.

3. Assembly reverse center gear to shaft.

4. Install retainer ring.

5. Install planet gear assembly.

6. Install reverse internal gear and bearing support.

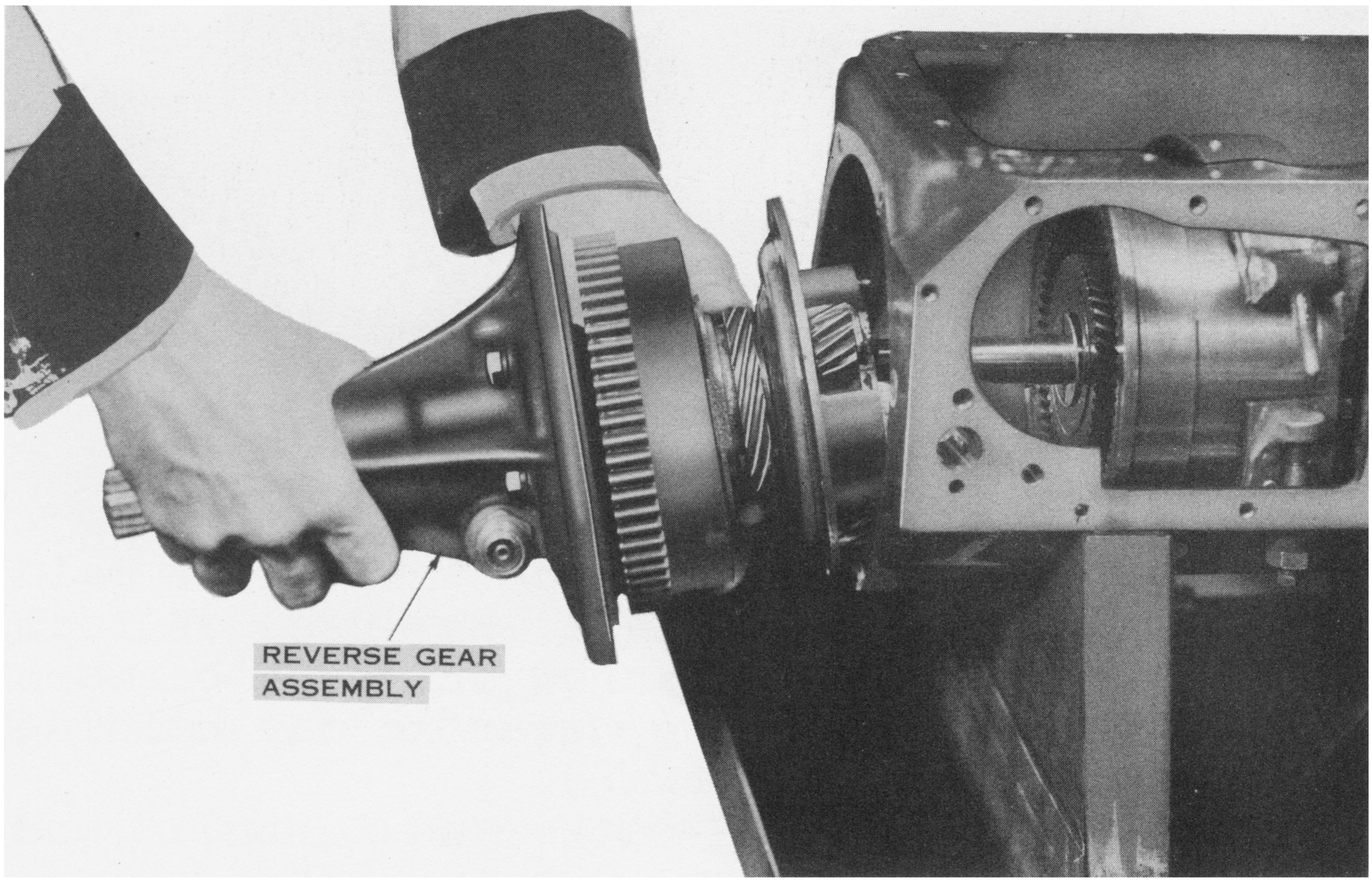
7. Install retainer ring and brg. retainer to assembly.

8. Press speedometer gear in place.

   Note: 9/16" clearance must be held between retainer ring and rear face of speedometer gear, using tool J-1464.

9. Install bearing retainer housing to bearing support. Use sealing compound on attaching screws to prevent oil leaks.

ASSEMBLE REVERSE GEAR ASSEMBLY



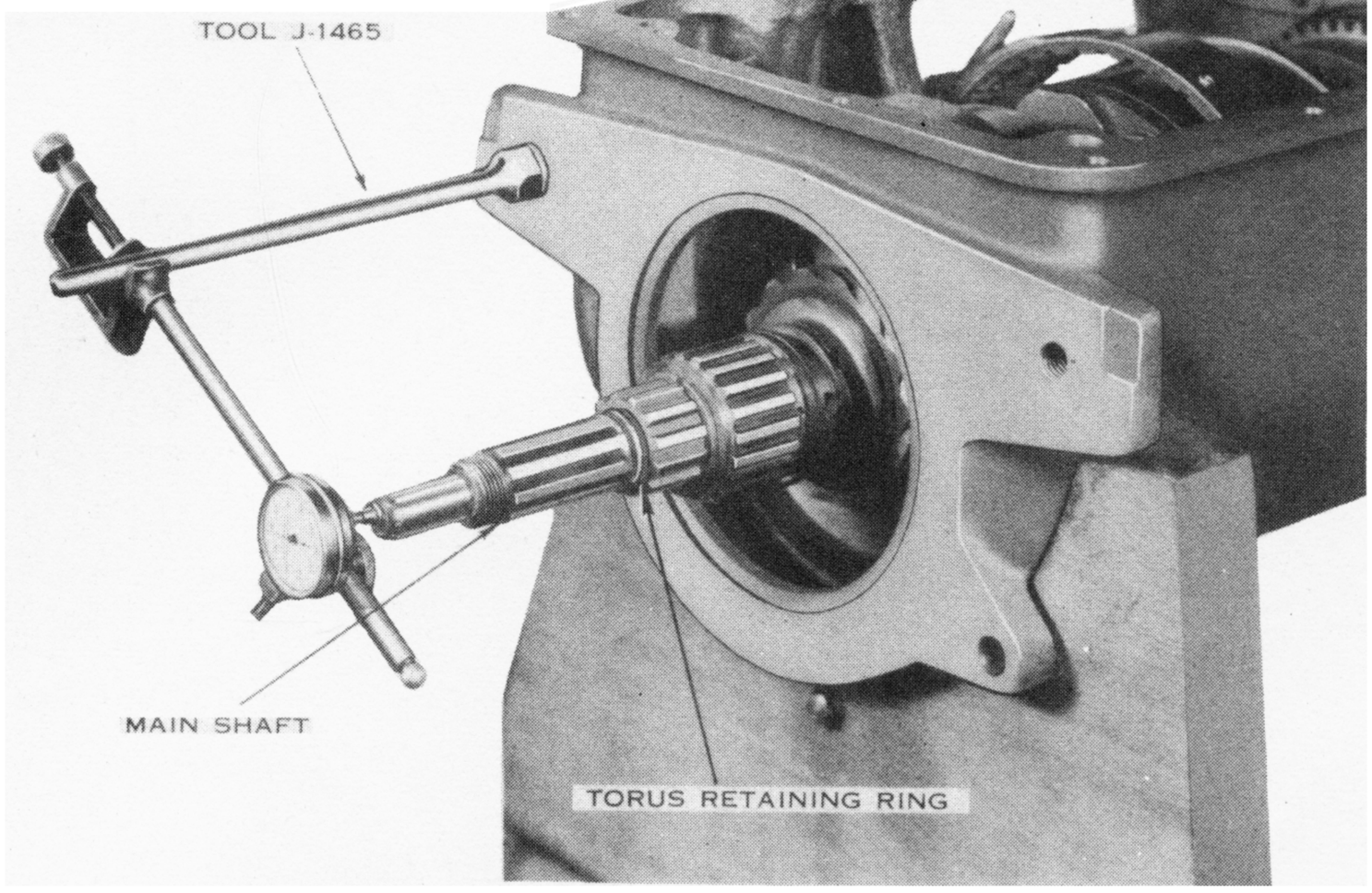
10. Assemble gasket to housing.

    It is recommended to use white vaseline to hold gasket in place. The use of shellac or permatex may dry quick, leaving uneveness and cause for oil leak. Be sure the thrust washers are in place on the main shaft.

11. Install reverse gear assembly into transmission case. Use sealing compound on attaching screws to prevent oil leaks.

12. Tighten the reverse gear drive flange to the rear unit drum.

CHECK END CLEARANCE OF MAIN SHAFT



1. Place dial indicator on the end of main shaft, held in place by use of tool J-1465. Insert a screw driver between front drum and center bearing cap holding planetary units forward.
2. Move main shaft back and forth, end clearance should be .006 to .014.

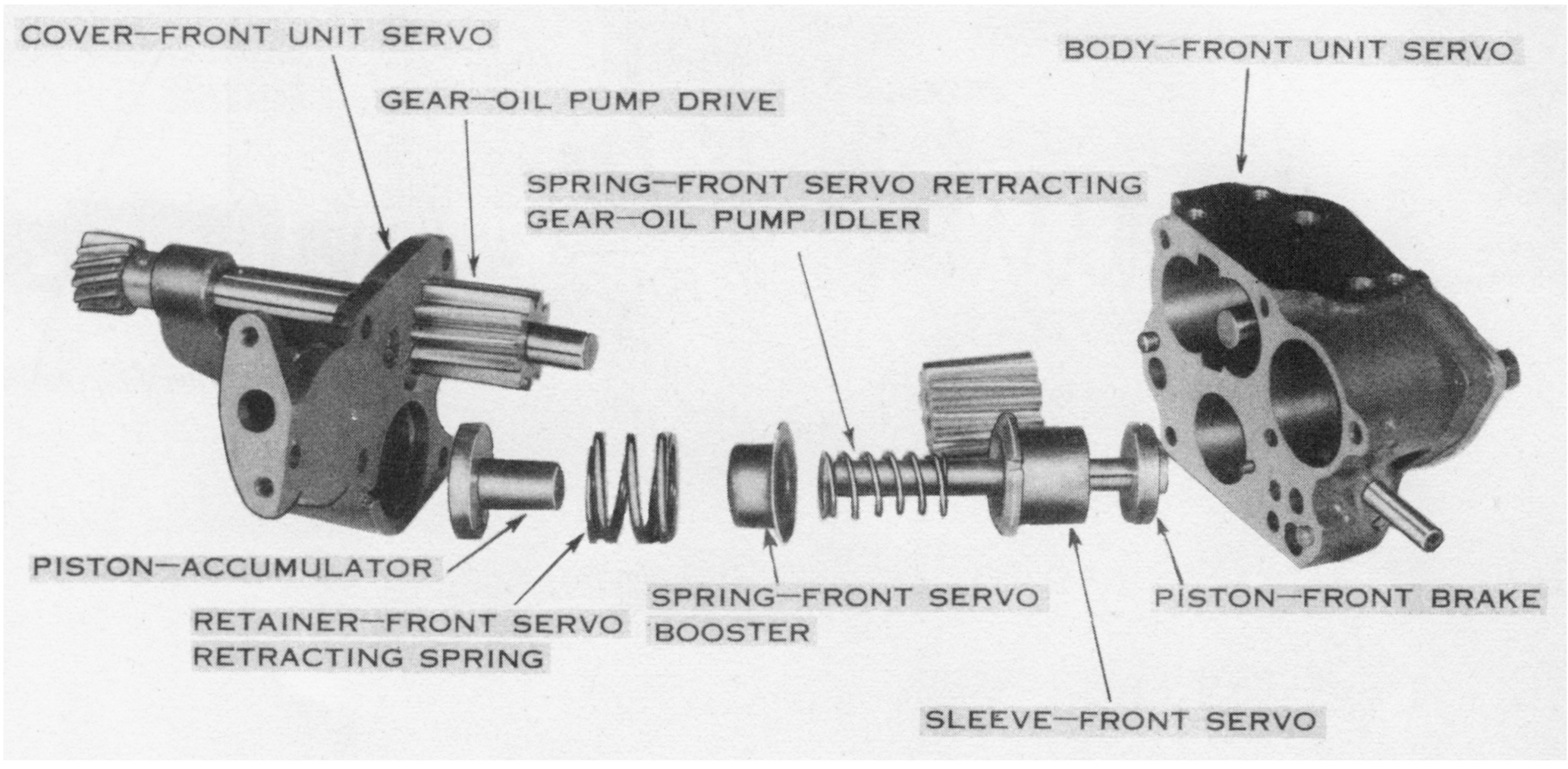
When it is found that the end clearance is less than .006 proceed as follows:

1. Remove reverse gear assembly from transmission case.
2. Remove the <u>selective</u> thrust washer, determine the thickness of washer. Then select a washer to obtain proper main shaft end clearance.
3. Install torus retainer ring to front end of main shaft.

Note: Selective washer will be furnished in (3) sizes as follows:

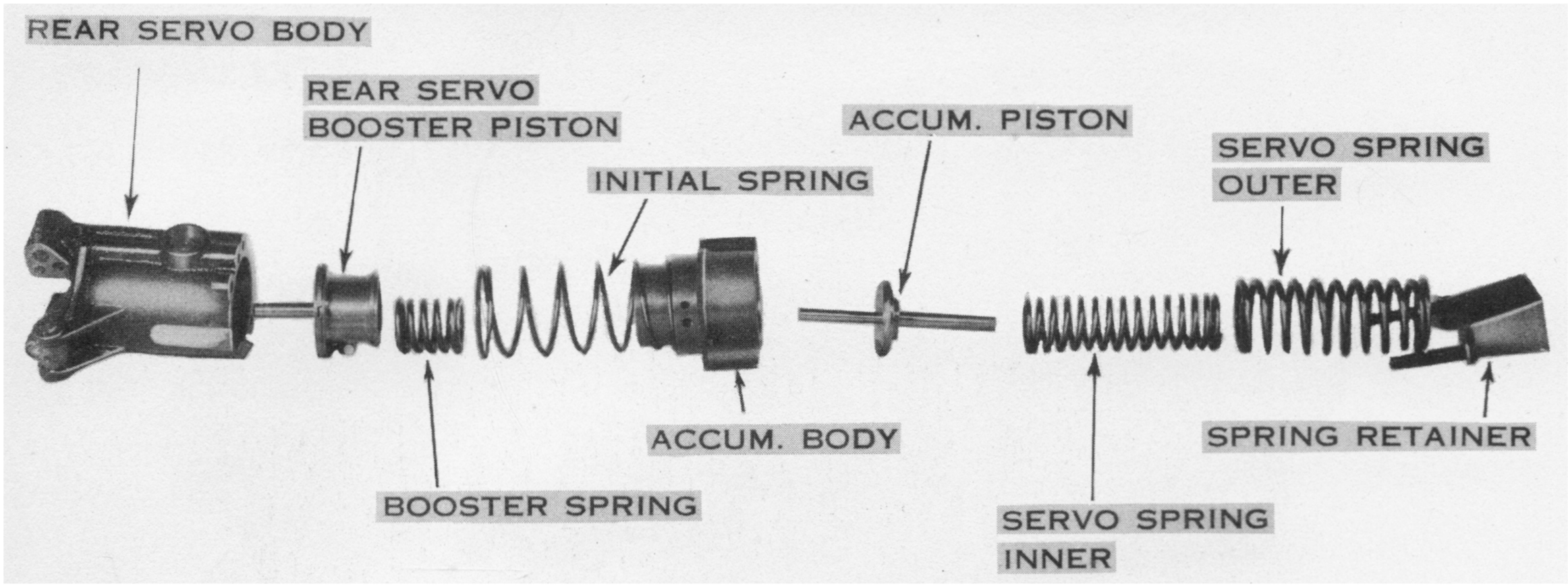
Part No.	Name	Size
8600145	Thin	.050 - .052
8600146	Med.	.063 - .065
8600147	Thick	.076 - .078

ASSEMBLE FRONT SERVO



1. Install Servo sleeve and piston.
2. Install retracting spring over shaft.
3. Install oil pump idler gear.
4. Assemble accumalator piston into pump cover.
5. Install booster spring and booster spring retainer.
6. Assemble cover to body.
7. Install suction line. Be sure gasket is in good condition.
8. Install servo into transmission case. Be sure that the plunger enters anchor on brake band.

ASSEMBLE REAR SERVO



1. Install servo booster piston.

2. Install booster spring.

3. Install servo initial spring.

4. Install accum. piston in body.

   Be sure small ring on booster spring is centered so it will enter accum. body freely.

5. Assemble accum. body to servo, holding in place while installing inner and outer servo springs and retainer.

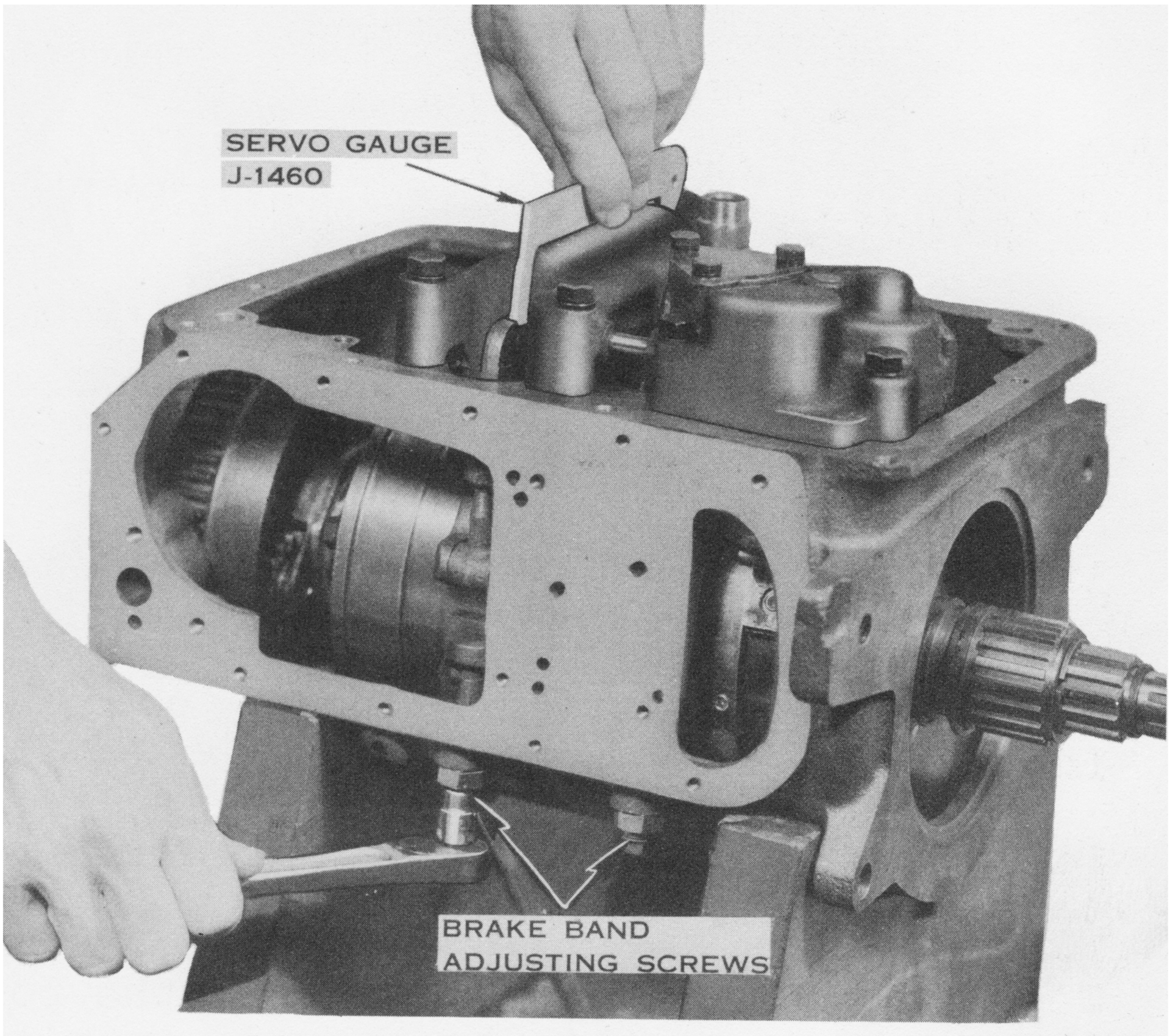
6. Place assembly in press to compress springs and tighten servo spring retainer screws to body.

7. Assembly rear servo to transmission case.

8. Adjust front and rear servo bands.

   The adjustment of the front and rear servo bands are entirely different. To adjust the rear servo band proceed as follows: -

ADJUSTING REAR SERVO BAND—

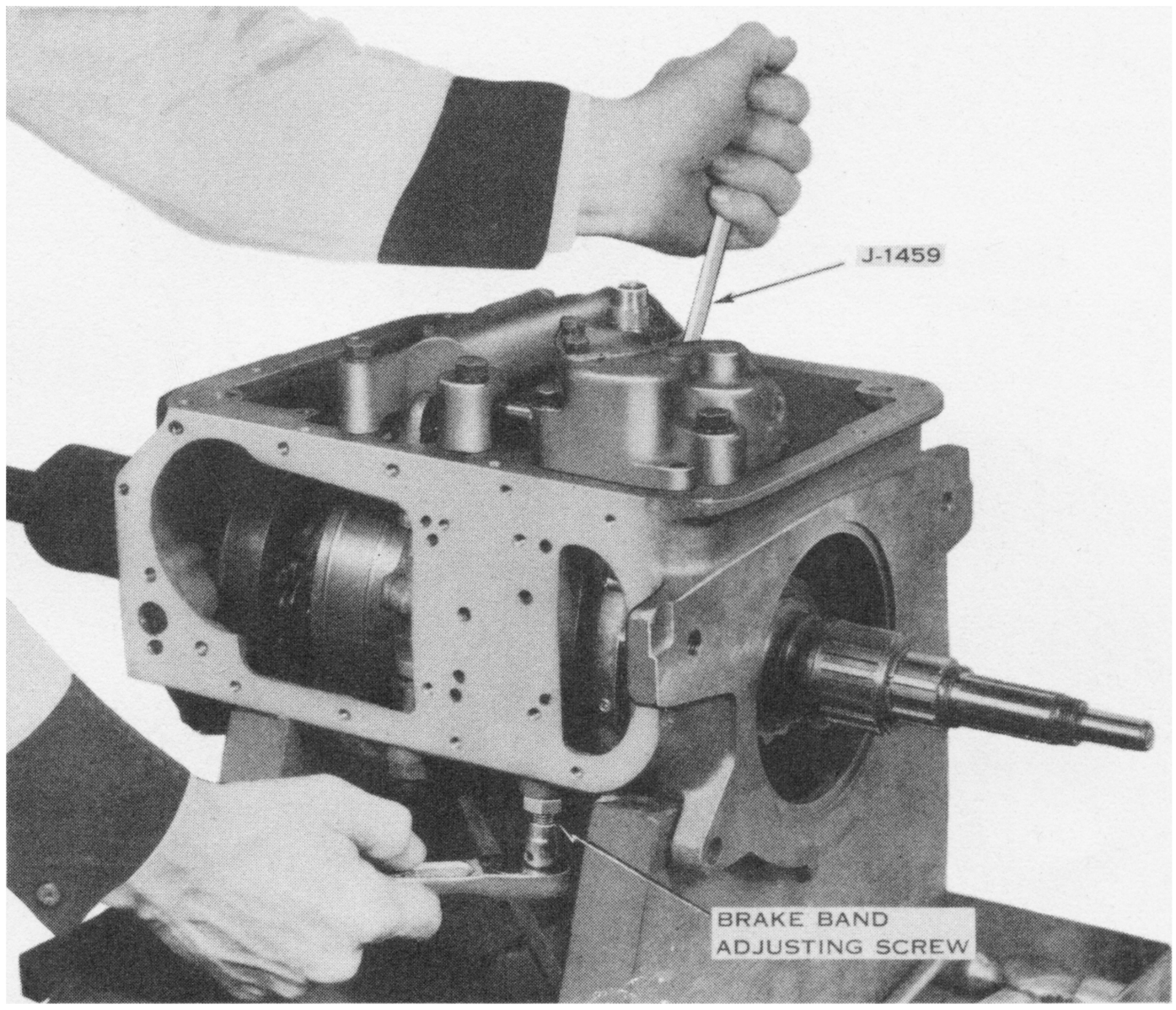


1. Place the brake band gauge J-1460 at bottom of servo.

2. Loosen servo band adjusting screw lock nut.

3. Adjust screw until the end of servo plunger is flush with outer edge of gauge within plus or minus 1/32." Release bar should be used while tightening adjusting screw on rear servo only.

ADJUSTING FRONT SERVO BAND—



1. Loosen lock nut.

2. Place tool J-1459 over cap screw in front unit.

3. Tighten adjusting screw just to the point where drum cannot be moved in either direction.

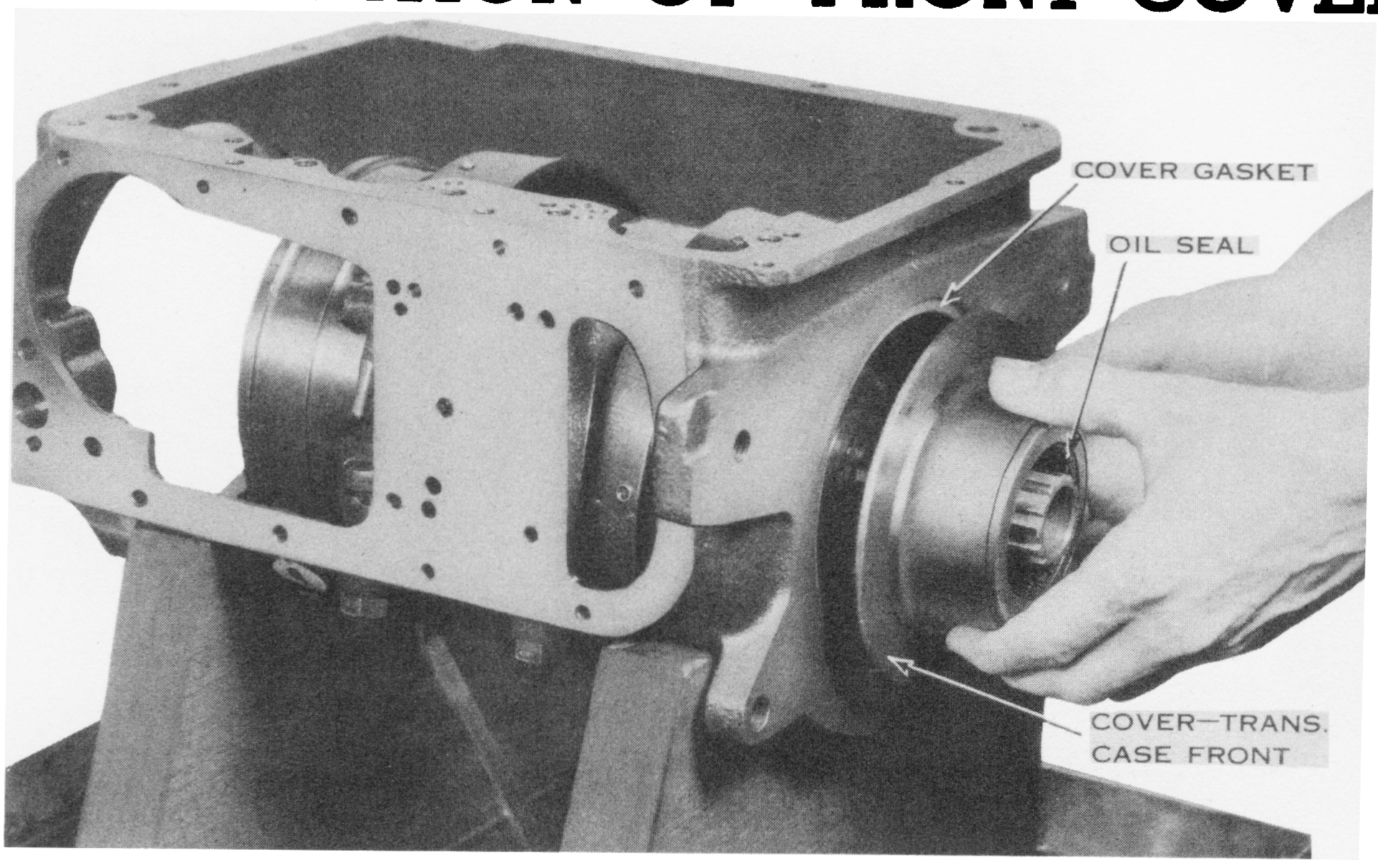
4. Mark servo band adjusting screw for identification position.

5. Back off adjusting screw 8 turns.

6. Tighten adjusting screw lock nut, being sure adjusting screw does not turn.

   Note: It is important that adjusting screw is not backed off more or less than 8 turns, and that only tool J-1459 be used when making this adjustment.

INSTALLATION OF FRONT COVER



1. Place gasket on front cover plate, held in place with vaseline.

2. Install the front cover and oil seal assembly. Use caution in sliding cover over front unit drive gear so oil seal rings will not be broken.

3. Install oil delivery pipes into front cover assembly.

4. Install oil pressure regulator valve, body and spring assembly.

5. Install governor and rear oil pump assembly.

   Note: When the oil valve body is removed the oil pipes may stay either in the governor or the valve body. Be sure they are in place between the valve body and the governor when these units are tightened in place.

OIL PUMPS

Two separate oil pumps are used in the HYDRA-MATIC transmission. The front oil pump, driven from the front unit drive gear operates whenever the engine is running and serves three functions; namely,

1. Filling the flywheel.

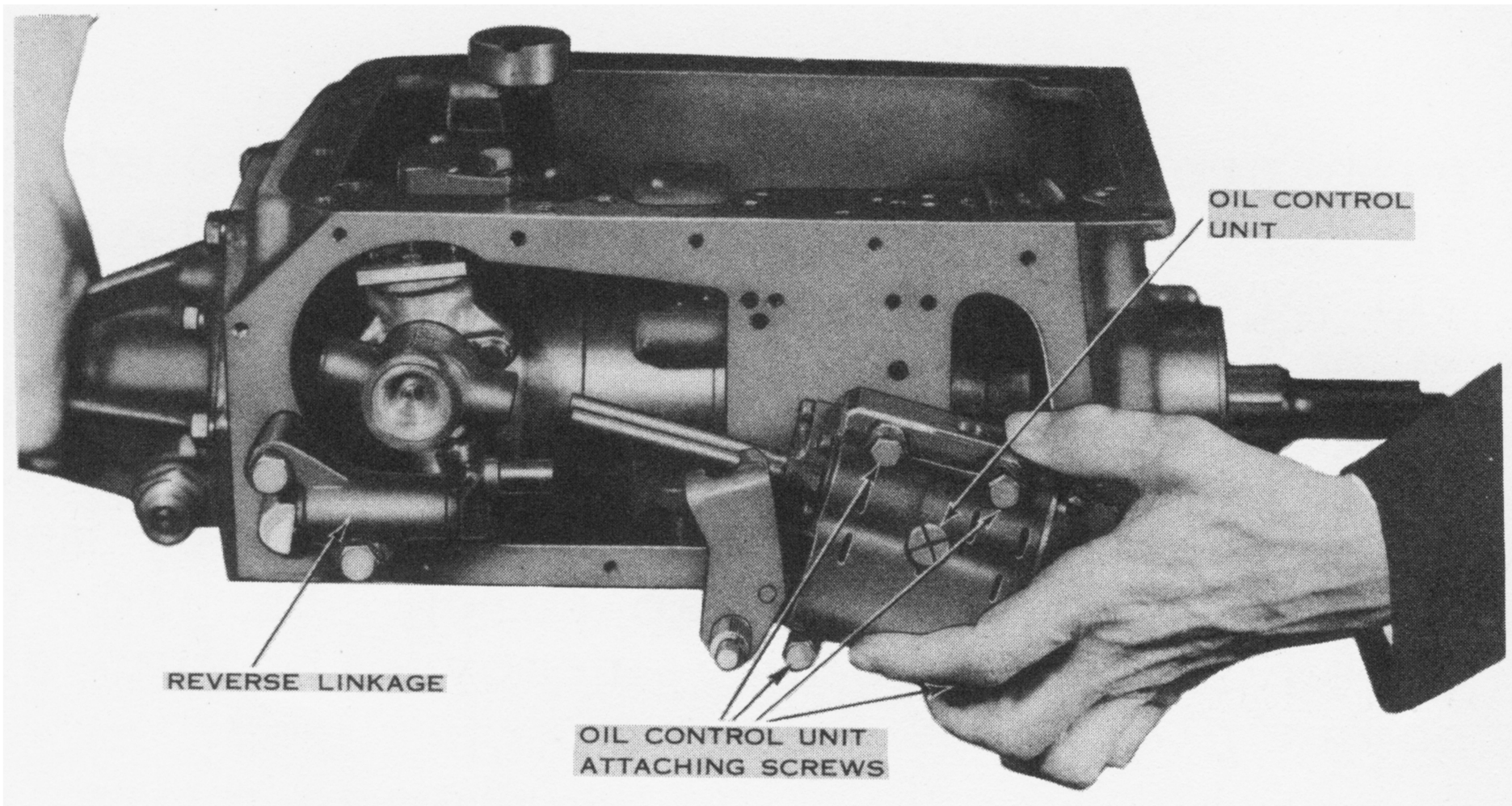
2. Supplying oil to lubrication system.

3. Supplying oil pressure to operate the servos and clutches as directed by the main oil control unit until such a time as the rear pump comes into operation.

At approximately 20 miles per hour the rear pump which operates off the transmission driven shaft develops sufficient pressure to take over the supplying of oil to operate the servos and clutches. From this point the front pump delivers oil only to the flywheel and lubrication system.

Division of the oil delivered by the two pumps is accomplished by a two-way valve located in the pressure regulator valve body through which all oil from both pumps must pass.

INSTALL OIL CONTROL BODY TO TRANSMISSION CASE



1. Install oil control body to side of transmission case, tighten screws evenly to prevent distortion.

2. Install reverse pawl.

3. Install reverse gear operating mechanism.

4. Install oil screen.

5. Install oil pan. Copper washers must be used on 3 screws on left side and 2 screws on the rear.

6. Install side cover. Be sure cork gasket is in place over shaft. Copper washers must be used on 7 lower screws.

7. Install manual shift outer lever.
   Note: The throttle control outer lever should be installed after transmission is installed in car.

OIL PUMP PRESSURE

Oil pump pressure can be checked through the use of service instrument J-1467 and a 100 lb. oil pressure gauge.

1. Remove plug in front of side cover plate.

2. Remove plug from governor sleeve by means of a $\frac{1}{4}$" standard cap screw thread cap screw into plug and remove through side cover plate.

3. Assemble fixture J-1467 into place in side cover plate and governor housing. Extreme care should be used when assembling this fixture to avoid any bind being put on the governor assembly.

4. Assemble dial gauge line to fixture plug, with dial section placed in front compartment so it can be read.

OIL PUMP PRESSURE

5. Operate car on the road until the fluid in the transmission is hot. With the shifting lever in the high range and the speed of the car dropped to 20 M.P.H. the oil pressure should not be less than 78 lbs.

6. If pressure is below 78 lbs. slipping may be due to excessive oil leakage somewhere in transmission, or pressure regulator valve assembly.

   1st. Inspect oil regulator valve body for tightness.
   2nd. Inspect for sticking regulator valve in body.
   3rd. Inspect for weak oil regulator valve spring.
   4th. Inspect for leak in main valve body.
   5th. Inspect for close fit in delivery sleeves between main oil valve body and governor sleeve.

Note: A weak regulator valve spring or leak in main oil valve body can be determined by substituting a new one.

UNITS THAT CAN BE SERVICED WITHOUT REMOVAL OF TRANSMISSION

1. Rear servo assembly.
2. Front servo and oil pump assembly.
3. Oil reg. valve, body and spring assembly.
4. Governor assembly.
5. Rear oil pump assembly.
6. Reverse gear anchor assembly.
7. Reverse Gear housing and oil seal.

PART VII

SPECIAL PARTS THAT REPLACE STANDARD PRODUCTION PARTS IN THE HYRA-MATIC DRIVE EQUIPPED CARS

SPECIAL PARTS THAT REPLACE STANDARD PRODUCTION PARTS IN THE HYRA-MATIC DRIVE EQUIPPED CARS

1. Transmission Front Compartment Cover.
2. Differential Assembly.
3. Propeller Shaft Assembly, 70-90 Model.
4. Engine x-member of frame.
5. Steering Gear Assembly including shift controls.
6. Throttle Linkage.
7. Speedometer drive gear combination.
8. Carburetor.
9. Crank Shaft Front Thrust Washer and Main Brg.
10. Floor Mat.

A description of the differences between these parts will be explained.

1

TRANSMISSION FRONT COMPARTMENT COVER

The transmission floor cover assembly located in the front compartment is different from standard in that there is no hole at the center for a gear shift lever. A small removable sheet metal plate held fast to the cover with a snap spring, provides a convenient means of reaching the oil level indicator.

2

DIFFERENTIAL ASSEMBLY

Model	No. of Teeth on Pinion Gear	No. of Teeth on Ring gear	Ratio
F-40 Std.	10	41	4.1:1
G-40 Std.) L-40 Std.)	10	43	4.3:1
Mountain	9	41	4.55:1
Plains	10	39	3.9:1
F-40 HYDRA.) G-40 HYDRA.) L-40 HYDRA.)	11	40	3.63:1

The differential gears differs from standard as shown in the above chart.

The differential cases and carrier assembly are identical and are interchangeable.

3

PROPELLER SHAFT

MODEL	TUBE SIZE	CENTER TO CENTER LENGTH	TRANS. REAR RETAINER LENGTH	LOCATION SLIP JOINT	ROUND BEARINGS	"D" JOURNALS
F-40 Std.	2-3/4	55-3/4	3"	Trans.	4 Front 2 Rear	-- 2 Rear
F-40 HYDRA.	2"	47-9/16	--	Trans.	4 Front 2 Rear	--- 2 Rear
G-40 Std.	2-1/4	52-1/8	11"	Trans.	4 Front 2 Rear	- - 2 Rear
G-40 HYDRA.			--	Trans.	4 Front 2 Rear	-- 2 Rear
L-40 Std.	2-3/4	55-3/4	11"	Trans.	4 Front 2 Rear	--- 2 Rear
L-40 HYDRA				Trans.	4 Front 2 Rear	-- 2 Rear
*G-40 Temporary	2	47-9/16	15-15/32	Trans.	4 Front 2 Rear	-- 2 Rear

*This combination will be used on G-40 using reworked frames and 1939 length of transmission rear retainer, up to car serial No. G 360964.

Because of the different wheel base between the "F" - "G" - and "L" model cars the above propellor shaft changes are shown, the universal joint flanges being the same.

4
CHASSIS FRAME

The chassis frame is different from the standard frame only in that the second cross member is different in design.

The second cross member in both the standard and the HYDRA-MATIC Transmission equipped cars are bolted to the frame side rails and are removable.

5
STEERING GEAR

A. The steering gear assembly is different only in that the column jacket is provided with attachments for supporting the transmission shifting control linkage.

B. The steering wheel is the same as standard and is interchangeable.

6
THROTTLE LINKAGE

Because of the interrelation of the performance of the engine and transmission, an entirely different throttle linkage is necessary from that of the standard models. These differences can readily be recognized from an inspection of the illustrations shown on page 69 of this chart.

7
SPEEDOMETER DRIVE GEAR COMBINATION

TIRE SIZE	AXLE TYPE	AXLE RATIO	DIFF. ASSEM.	TRANS. TYPE	SPEED GEAR RATIO	SPEED DRIVE GEAR	SPEED DRIVEN GEAR ASSEM.
6:00 x 16 (744 R.P.M.)	Mountain	41:9 (4.556)	502175	Synchromesh	7:23	1315449 7T	1315524 23T
	Standard	41:10 (4.1)	502173	Synchromesh	7:20	1315449 7T	1315522 21T
	Plains	39:10 (3.9)	502172	Synchromesh	7:20	1315449 7T	1315521 20T
	HYDRA-MATIC	40:11 (3.636)	502937	HYDRA-MATIC	7:18	1315449 7T	1315536 18T
6:50 x 16 (727 R.P.M.)	Mountain	41:9 (4.3)	502175	Synchromesh	7:23	1315449 7T	1315524 23T
	Standard	43:10	502174	Synchromesh	7:21	1315449 7T	1315522 21T
	Plains	39:10 (3.9)	502172	Synchromesh	7:19	1315449 7T	1315062 19T
	HYDRA-MATIC	40:11 (3.636)	502937	HYDRA-MATIC	7:18	1315449 7T	1315536 18T
	F-40 Option	41:10 (4.1)	502173	Synchromesh	7:20	1315449 7T	1315521 20T
7:00 x 15 (722 R.P.M.)	Mountain	41:9 (4.556)	502175	Synchromesh	7:23	1315449 7T	1315524 23T
	Standard	43:10 (4.3)	502174	Synchromesh	7:21	1315449 7T	1315522 21T
	Plains	39:10 (3.9)	502172	Synchromesh	7:19	1315449 7T	1315062 19T
	HYDRA-MATIC	40:11 (3.636)	502937	HYDRA-MATIC	7:18	1315449 7T	1315536 18T

ALL SPEEDOMETER GEARS ARE 26 PITCH
25° PRESSURE ANGLE

Because of the different tire sizes and axle ratio the speedometer drive gear combinations are shown.

8
CARBURETOR

HYDRA-MATIC transmission equipped cars have a special carburetor and differs from standard as follows:

1. Throttle levers.
2. Idle setting.
3. Choke coil and setting.
4. Fast idle cam.
5. Linkage connections.
6. Anti percolator setting.

9
CRANKSHAFT THRUST WASHER

All engines in cars equipped with the HYDRA-MATIC Transmission will have the crank shaft front thrust washer and front main bearing so designed to provide for more lubrication at this point. Later all production engines will use the new type thrust washer and bearing.

CAUTION:

No attempt should be made in the field to use other than the special designed washer and bearing in engines of HYDRA-MATIC equipped cars.

10
FLOOR MAT

The floor mat is different in that there is no hole on the left side for clutch pedal.

PART VIII

POLICIES GOVERNING THE HYDRA-MATIC DRIVE...

A. REPLACEMENT OF COMPLETE UNITS...

B. THE WARRANTY...

REPLACEMENT OF COMPLETE UNITS...

No attempts will be made to change complete transmission as in 1937.

Because of the three years' experience in servicing the former Automatic transmission, the close relationship between the units in the HYDRA-MATIC Drive and the advanced information now available through the 1940 service training program, dealers service managers and head mechanics will be in a position to properly service the HYDRA-MATIC Drive.

Zone service managers should set up those dealers in each zone who are fully familiar with and have been completely servicing the Automatic transmissions to likewise service the HYDRA-MATIC Drive.

THE WARRANTY

The following Warranty will apply to the new 1940 Oldsmobile HYDRA-MATIC Drive Assembly which assembly includes both fluid flywheel and automatic transmission.

POLICY

The Oldsmobile Division, General Motors Sales Corporation, Lansing, Michigan warrants each new Oldsmobile HYDRA-MATIC Drive Assembly to be free from defects in material and workmanship under normal use and service for one year after making delivery of new assembly to the original purchaser, provided only Oldsmobile HYDRA-MATIC Fluid was used in the assembly and the fluid changed at factory recommended intervals of every 5,000 miles or less for the duration of the Warranty period.

The Oldsmobile Division will accept charges for material and labor to replace transmission parts - charges to be based on factory established rates and will, in addition, accept all transportation charges of returned parts during the above ascribed Warranty period, which upon our examination shall disclose to our satisfaction to have been thus defective.

HYDRA-MATIC Drive Units will not be replaced as a unit except when replacement is recommended and approved by a Factory Zone Service Representative. Cost of a new unit and the labor to replace, as well as all transportation charges, under the above conditions will be accepted on an A.F.A. by the factory.

PART IX
QUESTIONS AND ANSWERS
ON THE
HYDRA-MATIC DRIVE

QUESTIONS AND ANSWERS ON THE HYDRA-MATIC DRIVE

OPERATION

Q: Can it be left in gear to hold it on a hill?
A: Yes, turn off the ignition key and shift lever to reverse.

Q: How does the fluid drive work?
A: It is very similar to a turbine drive, the same as used in power stations such as Boulder Dam, with the difference that the pressure at Boulder Dam is derived from a water head, whereas, we create pressure to drive the car by centrifugal oil pressure generated within the fluid drive.

Q: What is the pressure in the fluid coupling?
A: Oil comes in at the center at 30 pounds p.s.i. and builds up to 500 pounds p.s.i. pressure at the rim.

Q: Why does this job have less slippage than the conventional fluid flywheel?
A: HYDRA-MATIC Drive has much less slippage than conventional fluid drives because of an arrangement of parts which permits the torque delivered from the engine to be split and only 40% of it go through the fluid coupling. The remaining 60% is transmitted directly from the flywheel into the transmission mechanically in third and fourth gears. Slippage in

first and second is reduced because of the design of the fluid coupling in which all of the passages are laid out to give minimum restriction to the flow of oil.

Q: Does this car creep?
A: The tendency to creep in the Hydra-Matic Drive is much less than the tendency in other fluid drives because the fluid coupling is driven at .7 engine speed which reduces centrifugal force 50%. Thus, in effect, locates the fluid member between the front and rear units of the transmission, although it is actually placed ahead of the transmission.

Q: Is it necessary to hold the car with the brake when stopping and leaving the transmission in gear?
A: Not any more so than the conventional car with the clutch disengaged.

Q: Does the propeller shaft turn more slowly than in the conventional job?
A: It does in any gear ratio because of the lower ratio in the rear axle.

Q: What has been done in this device to overcome the following:
1. Hunting.
2. Clutch slippage and clutch plate wear.
3. Band breakage.
4. Oil pump failures.
5. Buzz.
6. Oil pumping in the wrong direction when car was backed up.
7. Sludge and varnish formation in the oil.

1. Hunting was caused by the transmission shifting from first to third. In the new device the transmission shifts from first to second to third and hunting is impossible.
2. The material of the clutch plates has been changed to give better friction characteristics and less wear. In the rear unit there are two additional bronze and two additional steel plates. Furthermore, the clutch is now controlled by six pistons in place of the three on our past model.
3. There were a few cases of band breakage which were due to manufacturing difficulties. This has been definitely overcome by a new manufacturing set-up.
4. Last year's device was dependent on one oil pump to supply the oil which made considerably more work for it to do than in this job because we have two pumps to do the work; furthermore, the engine type oil pump has been adopted toprevent anyfurther trouble.
5. The pressure regulator valve was the cause of the buzz and it has been redesigned.
6. The oil pump turns in the right direction now when car is backed up and does not introduce air into the system.
7. In order to insure the operator of getting a satisfactory lubricant which will not varnish, we are marketing a suitable Hydra-matic Drive fluid through our dealers which will prevent any sludge or varnish.

Q: If you are driving on a hill in third gear, why does the device have to get down to 10 M.P.H. beforeit shifts into a low gear?

A: It might be desirable to shift into a low gear at 20 M.P.H. However, if the device were arranged in this way, then in ordinary city driving, where the largest percent of driving is done, there would be excessive shifting when turning corners or slowing down for traffic.

Q: Why do you have 1-2-3-4 shift up and 4-3-1 down, eliminating the second gear when going down?

A: It actually does shift into second gear when operating conditions of the car are such that second gear is desirable. For instance, if you were driving up a hill such as Pikes Peak in third gear, with wide open throttle and the car speed dropped down to 10 M.P.H., under those conditions, the device would shift from third gear into second gear. However, the arrangement of these valves is such that at some throttle openings the device goes into first gear rather than second gear.

Q: Does it cause any additional load on the starter or battery when the oil is cold?

A: With the oil we specified for this device, there is no more load on the starter than in the conventional job.

Q: What is the life of the operating parts?

A: The life of the parts is the same as the life of the other parts of the car.

Q: Is it possible to tow the car?
A: Yes, just the same as a standard car.

Q: Will cold weather affect the HYDRA-MATIC Drive in the same manner as it affects the automatic transmission from the standpoint of drag when starting?
A: The starting of the engine is no different than the standard job with the clutch released. As far as any drag such as may have been experienced with the past model transmission, it has been completely eliminated by redesigning. At zero operation, instead of dragging, there is slightly more slippage of the fluid drive with thick oil than there is with oil of a temperature.

Q: Does the job creep more with cold oil?
A: No, it creeps less because cold oil doesn't circulate readily from the driver to the driven member of the fluid coupling.

Q: What are maximum operating temperatures?
A: The temperature of the transmission oil is about the same as that of the engine oil under general operating conditions. The normal highest operating temperature that is reached is 250°; if the car is driving in low gear continuously it may go still higher.

Q: Where is the automatic lock-out for high to low shifts on the HYDRA-MATIC Drive?
A: At 42 M.P.H.; that is, if the hand lever is shifted from "High" to "Low" above 42 M.P.H. the car will not shift to second gear.

Q: Does putting a car in low position in a hilly country automatically keep me in low gear until I release it?
A: It shifts from first to second and stays in second gear until shifted into high manually. The increased ratio in second gear in this new transmission plus the higher engine power obtained through use of fluid coupling gives ample tractive effort for almost any condition.

Q: If this transmission is fully automatic, then why do you have a high gear and low gear range on it?
A: Transmission is fully automatic for practically all types of operation that you will encounter in its usage. However, there are certain situations where the driver may find it advisable to stay in second gear and not shift into third and fourth, such as deep sand or when a car is accidentally put into a ditch or negotiating severe hills with a trailer. There are also a few mountains such as Pikes Peak where the power in third gear is not sufficient to maintain a desired speed. However, by shifting into the low position, the full benefit of the second speed reduction can be made available to negotiate the hill at any speed desired.

Q: Does the car creep when the engine is cold and the carburetor is on fast idle?
A: No, there is more slippage in the flywheel when the oil is cold, and the cold oil in the engine keeps the engine idle speed from going too high.

HYDRA-MATIC FLUID

Q: Will it be more costly to operate than the standard transmission?
A: It will be less costly to operate because the clutch with its maintenance expense is entirely eliminated in the HYDRA-MATIC Drive.

Q: Is HYDRA-MATIC fluid expensive?
A: No, it is the same price as good engine oil, .30 cents per quart.

Q: Where can I obtain HYDRA-MATIC fluid?
A: From 3800 authorized service stations in the United States.

Q: Can any reputable lubricating oil be used in case of emergency?
A: Yes, in an emergency it can be used temporarily to get to an authorized dealer's place of business where HYDRA-MATIC fluid can be obtained. 20W oil should be used if an emergency arises.

Q: Why must I buy HYDRA-MATIC Drive Fluid rather than use ordinary motor oil in the transmission?
A: Varnish and sludge that are present under certain operating conditions in standard oils interfere with the proper operation of the HYDRA-MATIC Drive. HYDRA-MATIC Drive Fluid contains an inhibitor which prevents formation of varnish and sludge. HYDRA-MATIC fluid has a characteristic that makes it usable the year around under any temperature conditions.

Q: Why can't HYDRA-MATIC fluid be purchased from filling stations?
A: HYDRA-MATIC fluid is a recent development and, in a short time, will be available at filling stations.

Q: What is the viscosity of the HYDRA-MATIC fluid?
A: The viscosity is the same as 10W motor oil at zero and 20W at high temperature.

Q: What is the difference between HYDRA-MATIC fluid and oil?
A: HYDRA-MATIC fluid is an oil, but is has two characteristics that are necessary to HYDRA-MATIC Drive; it is blended and has the characteristics of 10W oil at 0° and of 20W at 200°. It also contains a proven inhibitor which prevents the accumulation of varnish and sludge.

GENERAL

Q: Will any car other than Olds have HYDRA-MATIC Drive?
A: As far as we know, Olds will be the only one to have HYDRA-MATIC Drive in 1940.

Q: Can the HYDRA-MATIC Drive be installed in a standard car?
A: No, it requires frame, carburetor, rear axle and control changes.

Q: If the starter will not crank the engine, can the car be pushed to start it?

A: Yes, the control lever should be put in neutral and the car speed be brought up to 20 M.P.H. and then shifted to high and the engine will start.

Q: Is this the same fluid flywheel as used by Chrysler?
A: Principles are the same, but the design is entirely different. It is more efficient. Ordinary fluid flywheels at 60 M.P.H. develop as high as 5% slippage compared to 1/2 of 1% slippage in the HYDRA-MATIC Drive.

Q: Why do we call this the HYDRA-MATIC Drive?
A: "HYDRA" infers hydraulically operated; "MATIC" infers automatic control. This is a coined name.

Q: What will happen if I have trouble in a small town?
A: There is hardly any chance of having trouble that will prevent you from getting to a large town. Major break-downs are practically unknown and erratic operation will still allow you to get to a larger city.

COST

Q: What is the price of the HYDRA-MATIC Drive?
A: $57.00.

Q: I buy a car every year. Will the $57.00 I pay for this be made up within the year?

A: It will be partly made up in fuel economy and the rest will be made up by its convenience.

Q: How often will it have to be serviced and at what cost?
A: Outside of changing the HYDRA-MATIC fluid at 5000 miles, the unit will not require any more attention than your brakes.

Q: What are the maintenance operations required during the one year warranty period in the HYDRA-MATIC Drive?
A: 1. Change oil at 5000 miles.
2. Servo band adjustment at 10,000 miles.

COMPETITIVE

Q: Why is it necessary to change oil in the HYDRA-MATIC Drive when in the conventional fluid flywheel the oil is sealed in and good for the life of the car?
A: It is necessary to change oil in the HYDRA-MATIC Drive because the oil operates and lubricates the transmission as well as furnishes a drive for the fluid member; oil is thus changed to keep it clean.

Q: What is the difference between this planetary transmission and the planetary transmission in the Model 'T' Ford?
A: The only similarity is the gear arrangement. All the operation is different. The controls are automatic and hydraulically operated.

INTER-CHANGEABILITY

Q: If I do not like the HYDRA-MATIC Drive, can I put the standard transmission in my car?

A: You are bound to like the HYDRA-MATIC Drive.

MATERIAL

Q: What is the material of the servo band linings?

A: It is ordinary brake lining material.

COMPARISON TO FORMER AUTOMATIC TRANSMISSION

Q: Does it have any of the same characteristics as the automatic safety transmission?

A: At the present time there are 30,000 automatic transmissions operating satisfactorily in the hands of owners. The new HYDRA-MATIC Drive represents an improvement over the present automatic transmission. The basic principles of the automatic transmission whereby gear reductions are made through two planetary units which are operated by oil pressures have been retained and incorporated in this new device. In the automatic transmission, speeds at which shifting occurred depended upon a mechanical governor and oil pump capacity at low speeds; whereas, the HYDRA-MATIC Drive is controlled entirely by a hydraulic governor and throttle.

Another important improvement in the HYDRA-MATIC Drive over the automatic is the use of two distinct oil pumps rather than the single oil pump used in the previous model. The addition of the fluid drive in conjunction with these changes in the transmission makes a fully automatic transmission and eliminates the clutch pedal.

ADVANTAGES

Q: What are the benefits of the HYDRA-MATIC Drive?

A:
1. Increased gasoline and oil economy.
2. No clutch to press, no gears to shift.
3. Increased safety.
4. Longer engine life.
5. Elimination of clutch maintenance expense.
6. Less driving fatigue.
7. Added performance.

POLICY

Q: What is the warranty on the HYDRA-MATIC Drive?

A: Olds warrants the HYDRA-MATIC Drive on both labor and material for one year from date of purchase, providing HYDRA-MATIC fluid is used. Olds has so much confidence in this unit that they are departing from the 4000 mile or 90 day warranty period for the first time.

PART X

TECHNICAL DATA CHARTS

TECHNICAL DATA CHARTS

	HYDRA-MATIC DRIVE	STANDARD
Axle Ratio	3.64	4.3
Speed reduction thru trans.-1st Gear	3.66	2.666
Speed reduction thru trans.-2nd Gear	2.53	1.661
Speed reduction thru trans.-3rd Gear	1.44	1.00
Speed reduction thru trans.-4th Gear	1.00	--
Speed reduction thru trans.-Rev. Gear	4.31	3.022
Speed reduction at rear wheels-1st Gear	13.32	11.46
Speed reduction at rear wheels-2nd Gear	9.20	7.14
Speed reduction at rear wheels-3rd Gear	5.24	4.3
Speed reduction at rear wheels-4th Gear	3.64	--
Speed reduction at rear wheels-Rev. Gear	15.69	12.99

POSSIBLE SHIFTS AND APPROXIMATE SPEEDS AT WHICH THEY OCCUR

SHIFT	M.P.H.
HIGH RANGE - UP SHIFTS	
1 - 2	7 - 15
2 - 3	13 - 30
3 - 4	20 - 65
LOW RANGE - UP SHIFTS	
1 - 2	7 - 23

Note: Miles per hour at which shift is made is dependent upon throttle opening.

HIGH RANGE - DOWN SHIFT	
4 - 3	12 - 13
3 - 1	3 - 4
LOW RANGE - DOWN SHIFT	
2 - 1	4 - 5

Note: Above shifts in miles per hour based on closed throttle.

Throttle down shift from 4 - 3	14 - 60
Forced up shift from 3 - 4	65
Low range lock out	42

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